PRICE 50 CENTS

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

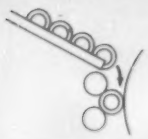
NOVEMBER 22, 1954

Forming Integral Skins

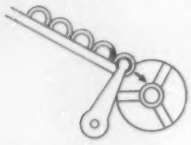
A SPECIAL REPORT

Ceramic Cutting Tools
Intricate Investment Casting

Contouring densified wood
— see page 2

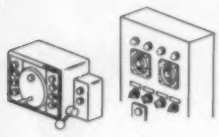


AUTOMATIC LOADING AND LOCATING IN CENTERLESS ROLLS



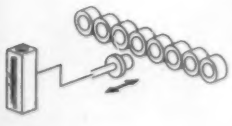
AUTOMATIC CHUCKING

AUTOMATIC LOADING AND LOCATING, CENTRI-MATIC

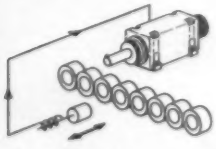


AUTOMATIC CYCLES

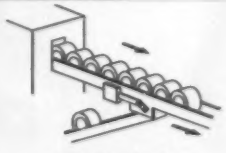
AUTOMATIC SIZING



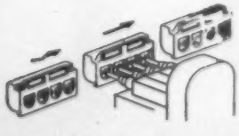
AUTOMATIC GAGING



FEED-BACK

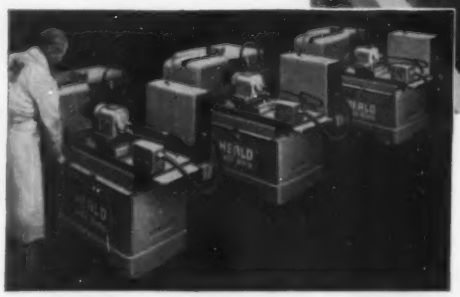


AUTOMATIC HANDLING AND SORTING



AUTOMATIC TRANSFER

Heald transfer-type Bore-Matic arranged for fully automatic drilling, reaming, boring and facing of valve seats and stem holes in automotive cylinder heads. Machine consists of a series of basically standard Heald way-leg units, sequentially machining the work through the various stations to the far end fully automatically.



Heald battery-type Internals permit fully automatic operation of a bank of machines from a single hydraulic power unit. One operator can easily tend several machines.

How Heald AUTOMATION fits into your production plans

AUTOMATION is the newest trend in modern production efficiency. Yet it has occupied the attention of Heald engineers for many years. In fact a number of important developments contributing to fully automatic operation were developed here at the Heald plant more than a decade ago. And research on automation has progressed unceasingly, as witnessed by scores of fully automated transfer machines, way-type Bore-Matics and battery type Internals now operating successfully in the field.

This background of experience is at your disposal—ready to solve virtually any precision finishing problem, carrying it through in many cases from rough casting to finished part. Your nearest Heald representative will welcome an opportunity to show you how Heald AUTOMATION can step up precision and production, with important savings in time and cost factors.

You'll find that IT PAYS TO COME TO HEALD!

THE HEALD MACHINE COMPANY ®

WORCESTER 6, MASSACHUSETTS

Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

CONTENTS FOR NOVEMBER 22, 1954 VOL. 98 NO. 25

ADMINISTRATION

111 EDITORIAL *Burnham Finney*

145 REFORMED OR DEFAMED *Round Table*

SPECIAL REPORT

129 HOW TO FORM INTEGRALLY STIFFENED SKINS *W T Kluge*

MATERIALS CUTTING, FORMING

116 PRESS BRAKE IV . . . FOR SAFETY, BEND ACCORDING TO THE RULE *J M Matthewman, J S Plant*

127 HOW ABRASIVE-BELT GRINDING IMPROVES TAPER SHEET PRODUCTION *J R Burns*

141 HAND-FORMING . . . MACHINE STYLE *Norman L Whipple*

149 GUIDED TOOL TURNS LARGE OD *G H Rogers*

TOOLING

113 RUSSIAN REPORT . . . CERAMIC-TIPPED TOOLS WILL CUT STEEL

121 INTRICATE INVESTMENT CASTINGS REQUIRE SHOP "SAVVY" *John P Wright*

142 SOUND TOOLING SIMPLIFIES TOUGH PROGRESSIVE DIE *John Brown*

146 59% REDUCTION IN TOOL COST

147 JIGS AND RIGS CUT DENSIFIED WOOD

148 SIMPLE HOLD-DOWN BLOCKS FOR PLANERS *A G Liska*

149 LAYOUT DYE SPEEDS MACHINING *Carl Jensen*

150 KNIFE-EDGED SINE SQUARE *H J Gerber*

151 "DUPLICATOR" EASES DIE LAYOUT *H J Gerber*

152 HINGED SPACERS AID MILLING FLATS *L H Austin*

157 GEAR-HOB TOLERANCES *Herbert V Gregg*

157 DIE-SETTER'S MANUAL . . . IV *Edward P Boehlein*

INSPECTION

151 LIMIT SWITCHES GAGE CENTERS *Jack W Farrell*

NEWS OF METALWORKING

97 SPOT NEWS

99 WASHINGTON

101 DETROIT

103 MACHINE TOOLS

107 GAGING METALWORKING

162 NEWS OF METALWORKING

DEPARTMENTS

93 BACKLASH

148 PRACTICAL IDEAS

155 REFERENCE BOOK SHEETS

161 TALKING SHOP

172 EQUIPMENT, MATERIALS, PARTS

176c NEW BULLETINS

212 ROUND TABLE DISCUSSION

230 REPRESENTATIVES AND DISTRIBUTORS

BURNHAM FINNEY editor
E J TANGERMAN executive editor

ANDERSON ASHBURN special projects editor
RUPERT LE GRAND senior associate editor

BEN BROSHEER (Chicago) associate editor
H E LINSLEY associate editor
CHARLES D EMERSON associate editor
WM M STOCKER, JR associate editor
JOHN P WRIGHT associate editor
GEORGE H DE GROAT (Detroit) associate editor

ANN McTAGUE assistant editor
JACK MERRIAM assistant editor
KENNETH KLINE assistant editor

RICHARD E ROOMAN art director
ANNE PALMER assistant
EUGENIA S PATTERSON makeup

ROBERT SHEETS news editor
JAMES C JONES Detroit
ROBERT E COCHRAN Cleveland
MARGARET RALSTON San Francisco
JAMES A LEE Houston
WILLIAM H KEARNS Atlanta
EDWARD W S HULL London
JOHN O COPPOCK Paris
LIONEL J HOLMES Sao Paulo
GERALD W SCHRODER Bonn
DAN KURZMAN Tokyo
HERBERT LEOPOLD Melbourne
JOHN WILHELM Mexico City
ALAN ADAMS labor editor
DOUGLAS GREENWALD statistician

DEXTER KEEZER director economics dept.
GEORGE B BRYANT, JR chief Washington bureau
J K VAN DENBURG, JR editor world news
FRED H COLVIN editor emeritus

ALBERT HAUPTLI publisher
GEORGE REPPERT, JR advertising sales manager
RUSSELL T DOUGLAS business manager
HUGH BRITTON manager, market research
CATHERINE C KANE manager, reader service

DISTRICT MANAGERS

W D Lanier Rhodes-Haverty Bldg, Atlanta 3
John H Koch 350 Park Square Bldg, Boston 16
Willard J Haring McGraw-Hill Bldg, Chicago 11
P F Pritchard McGraw-Hill Bldg, Chicago 11
Robert Anderson 1110 Delta Ave, Cincinnati 8
Robert Anderson Hanna Bldg, Cleveland 15
Richard H Burke Hanna Bldg, Cleveland 15
James Cash First Natl Bank Bldg, Dallas 1
Wm J Reichard Penobscot Bldg, Detroit 26
H L Keeler 1111 Wilshire Blvd, Los Angeles 17
Gus H Krimsier McGraw-Hill Bldg, New York 36
John F Juraschek McGraw-Hill Bldg, New York 36
John Tiebout Architects' Bldg, Philadelphia 3
P F Pritchard Continental Bldg, St. Louis 8
Richard H Burke 719 Oliver Bldg, Pittsburgh 22
Ralph E Dorland, Jr 68 Post St, San Francisco 4

American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index

American Machinist, published bi-weekly, with an additional issue in mid-November, by McGraw-Hill Publishing Company, Inc. James H McGraw (1860-1948), Founder.

EXECUTIVE, EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Donald C McGraw, President; Willard Chevalier, Executive Vice President; Joseph A Gerardi, Vice President, Treasurer; John J Cooke, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B Smith, Vice President and Editorial Director; Nelson Bond, Vice President, Director of Advertising; J E Blackburn Jr, Vice President, Director of Circulation.

SUBSCRIPTIONS: Address correspondence to American Machinist-Subscription Service, 330 West 42nd Street, New York 36, N.Y. Allow one month for change of address. Subscriptions are solicited only from production executives and engineers in the metalworking industries. Position and company connection must be indicated on subscription orders.

Single copies, 50c. Subscription Rates—United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada $7 for one year, $11 for two years, $14 for three years. Other Western Hemisphere and the Philippines, $15 for one year, $25 for two years, $30 for three years. All other countries $25 for one year, $40 for two years, $50 for three years. Reentered as second-class matter, November 17, 1953, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

Copyright 1954 by McGraw-Hill Publishing Co. Inc. — All Rights Reserved.

NUMBER OF COPIES PRINTED THIS ISSUE 37,769

chips

AIR CONTOURING . . . Contouring a knife handle of "Strata-wood," a densified and impregnated wood, is done in a special machine at Formica Co, Cincinnati. Our cover Kodachrome shows the setup, and details are provided in a single-page article in this issue. Radius-form cutters produce up to 75,000 blanks before regrinding. There are eight fixtures on the machine, four at each of two distances from the dial center so two different radii can be produced. . . . Two other special machines are also shown in the article, one for drilling and counterboring rivet holes, the other for slotting handles for the steel tang. All were shop-built and run on air.

TRICKY CASTINGS . . . K W Thompson Tool Co, a small jobbing shop with plenty of "savvy", has sucessfully cast intricate shapes to close tolerances. The investment method proved to be the answer when methods undertaken by bigger shops failed. John Wright, associate editor, gives you details in a well-illustrated 6-page analysis. . . . Associate Editor Wright turns up later on in the same issue with a description of a 10-stage progressive die.

INTEGRAL STIFFENING . . . W T Kluge of North American Aviation (see biog) provides our current Special Report. It shows how to form integrally stiffened skins, discusses the special problems in getting both skin and ribs right. Sometimes stretch forming works, sometimes it doesn't. Mr Kluge reviews NAA methods, including two new ones: form-die quenching in metallic shot, and prestress hot forming.

CERAMIC TOOLS . . . For a year and more, we've been trying to get you the lowdown on ceramic cutting tools. Announced in England, one set was supposed to have been tested in the US, but no one, here or there, has been talking. Now, we find that the Russians have published several articles on the subject. So here, in 3 pages, are tool drawings and data that will interest you.

BELT-GRINDING TAPERS . . . You will recall that, two years or more ago, Bell Aircraft announced successful belt grinding of tapered sheets. Now, in a further 3-page report, J R Burns, supervisor of mfg research there, describes the new Hill-Acme belt grinder and how it removes metal for less than 10 cents a pound. It's a special job, but very new and interesting.

BRAKE NO. IV . . . At long last, we bring you Part IV of the series on press brakes by J M Matthewman, works manager of Jas Smart Plant, Canada Foundries & Forgings, Ltd. This one covers rules for bending and forming, gives formulas, explains use of spring pads to avoid kinks, offers rules for die setting and progressive forming. . . . This article concludes the series.

COMING . . . *AM* for Dec 6 will include 16-page Special Report on rust and corrosion, plus articles on shop photography for records, forming and welding Ti, job-lot tooling, silver brazing, and *big* contour sawing, plus several other features. It will be worth taking a little time from your Christmas planning to read.

FORMING RESEARCHER . . . William T Kluge is a fabrication group leader in the production development laboratory at North American Aviation. A native of Portland, Ore, and a graduate of the California Institute of Technology, with a BS in Applied Chemistry, he has worked in aeronautical research, with emphasis on production, since joining NAA in 1941. Research in production forming has been his main concern and provides the background from which he describes, in our current Special Report, the methods of forming integrally stiffened skins. Married, and the father of three sons, he likes to devote what spare time he can find to hiking, camping, and photography.

Get high-production precision gear grinding with this new machine!

You can now increase production and get the highest degree of accuracy and uniformity in medium to fine pitch gears with the new Gleason No. 7 Hypoid Grinder.

A completely automatic wet-type grinder produces gears with excellent finish and assures the ultimate in durability and in accuracy of transmitting motion.

A single lever controls operation of the hydraulic guard doors and chucking of the work. Change time for each piece is cut to a minimum.

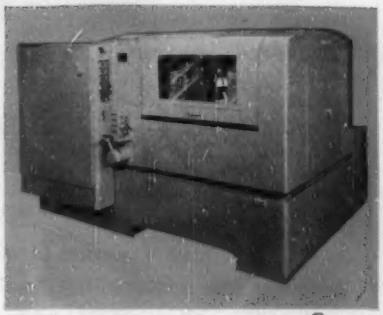
Automatic in operation

Once the gear is chucked in the workhead, the operation is automatic. At preselected intervals, the grinding wheel is automatically dressed. When the gear is finished, the machine stops automatically.

Gears 20 DP and finer are ground directly from the solid. Coarser pitches are ground after semi-finish cutting and hardening. The automatic features of this grinder assure uniformity of all pieces ground, so that the gears are truly interchangeable.

The No. 7 Hypoid Grinder is easily set up and is ideal for small quantity or volume production.

More complete information on the Gleason No. 7 Hypoid Grinder will gladly be sent upon request.



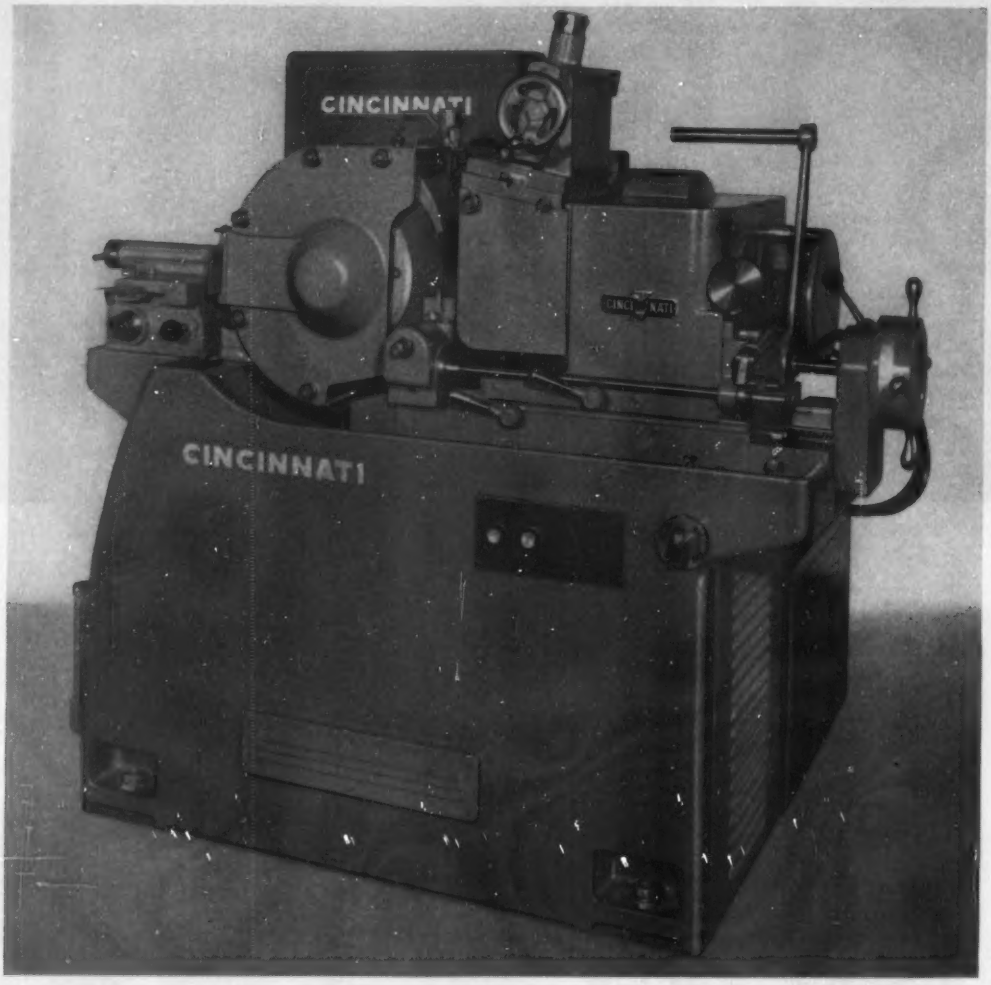
The No. 7 grinds spiral bevel, Zerol® bevel, and hypoid gears up to 8½" diameter, 4 DP and finer.

GLEASON WORKS

Builders of bevel gear machinery for over 85 years

1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.

Take a new look at your



Cincinnati Filmatic No. 0 Centerless Grinder. Catalog No. G-640.

FILMATIC

CINCINNATI

CENTERTYPE GRINDING MACHINES •
MICRO-CENTRIC GRINDING MACHINES

replacement program

the NEW CINCINNATI FILMATIC No. 0 CENTERLESS GRINDERS . . .

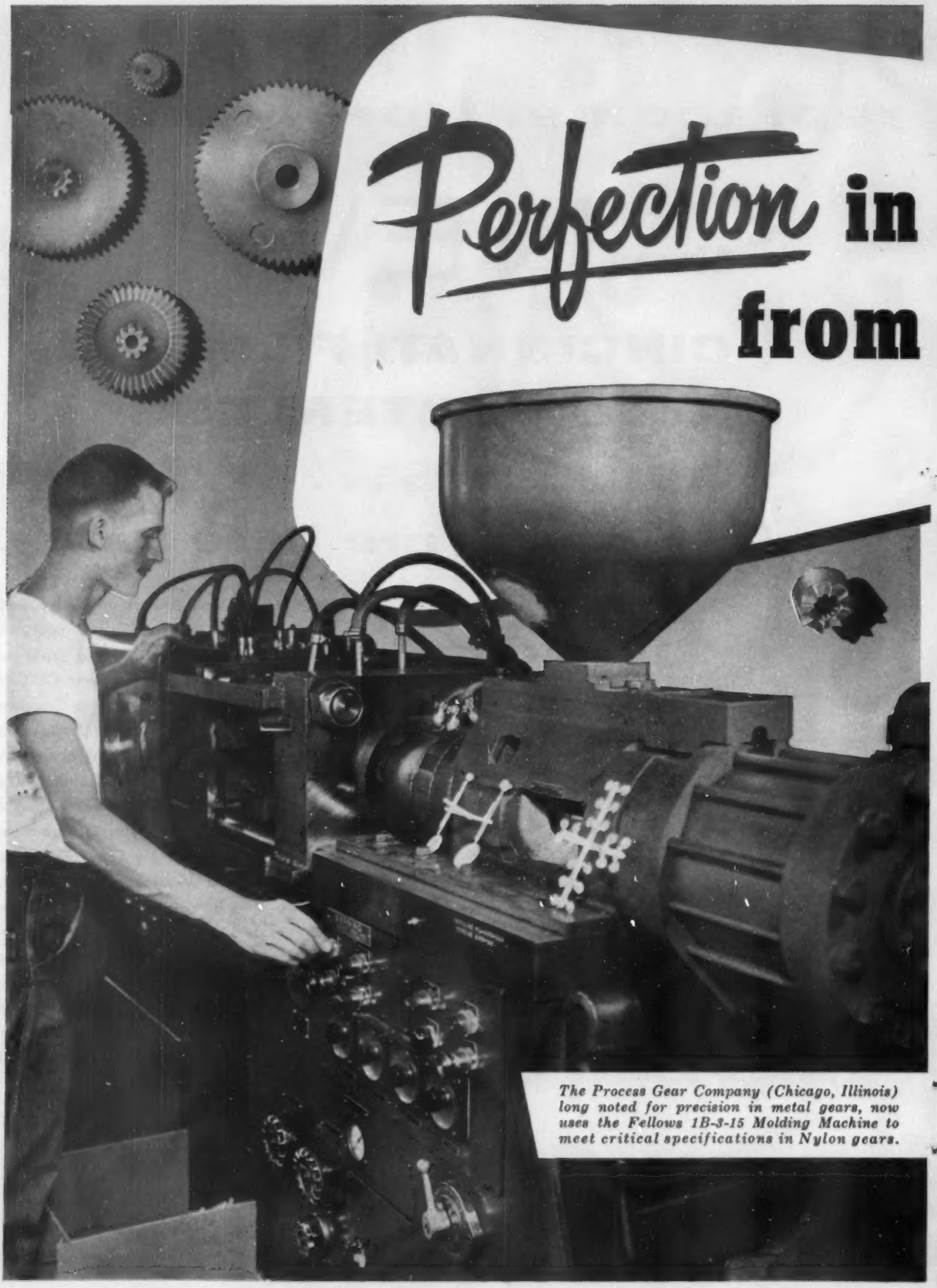
are here today!

New machine tools always offer new profit possibilities. In the small parts precision grinding category, a substantial profit potential will be found in the new CINCINNATI FILMATIC No. 0 Centerless Grinders. Exclusive Cincinnati features, based upon 30 years of centerless experience, have been retained: Filmatic grinding wheel spindle bearings; "bed-rock" mounting of grinding wheel spindle; simple, direct truing of wheels. And now Cincinnati offers new advantages such as extra low maintenance with hardened and ground slideways and oil-shot lubrication; an extra measure of production with handwheel selection of infinitely variable regulating wheel speeds; higher quality finish and closer limits of accuracy than ever before. Catalog No. G-640 contains the complete story. Write for a copy today.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

CINCINNATI



The Process Gear Company (Chicago, Illinois) long noted for precision in metal gears, now uses the Fellows 1B-3-15 Molding Machine to meet critical specifications in Nylon gears.

Nylon* Gears Every Shot!

...from a Fellows 1B-3-15 Molding Machine

Good news for every molder who wants to build quality business.

The same Fellows Molding Machines you use for styrene, polyethylene and so many other materials will produce high quality Nylon Moldings with efficiency and dependability.

With proportional temperature controllers and a Fellows temperature controlled Nylon nozzle, machines can be operated hour after hour without drool. Plasticizing rates are second to none on this normally derating material. Tolerances to thousandths of an inch at high production rates allow any molder to capitalize on Nylon properties and profits.

There is a Plastics Machine Specialist at each Fellows Sales Office, ready and able to plan with you on cutting your molding costs. Write, wire or telephone today.

*"ZYTEL" NYLON A DUPONT PRODUCT

Fellows

injection molding equipment

THE FELLOWS GEAR SHAPER COMPANY, Plastics Machine Division, Head Office and Export Department, Springfield, Vermont
Branch Offices: 319 Fisher Bldg., Detroit 2, Michigan • 5835 West North Avenue, Chicago 39, Illinois • 2206 Empire State Bldg., New York 1, N.Y.
5 Martel Bldg., 6214 West Manchester Avenue, Los Angeles 45, California.

For Peak Production

at Rock-Bottom Cost

...in Precision Plunge or Traverse Grinding of Small Parts—

VAN NORMAN — Manufacturers of Ram and Column Type Milling Machines, Cylindrical Grinders, Spline Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders

"Auto-Cycle" infeed attachment (illustrated) provides completely automatic cycle for plunge grinding (optional).
Work size 4" Diam. x 18" Long. Grinding Wheel 14" O.D. x 2" Wide. 3 H.P. Wheel Motor Optional.

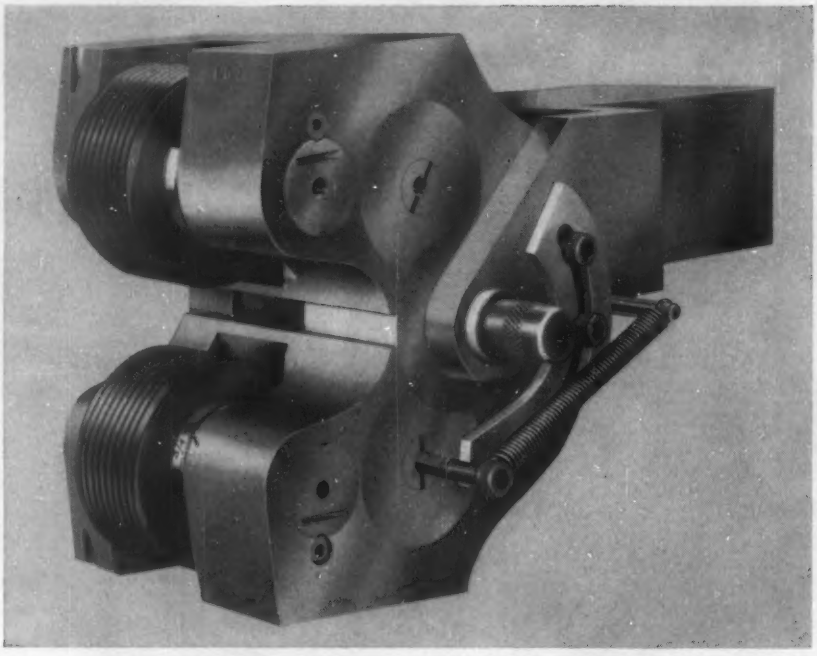
This ultra-modern 418 cylindrical grinder cuts costs of small part grinding. It is especially adaptable for use in tool rooms, job shops, or plants where work is in small, medium or production runs. Jobs are quickly set-up... work pieces are easily loaded, ground and unloaded. Every feature in the 418 cylindrical grinder *spells accuracy, speed* and *economy.* Get the full facts today. Write for information.

Cylindrical Grinder

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

Coarse Pitch Threads Rolled to Class 4 Fit..



The LANROLL Thread Rolling Attachments offer features designed to ensure greater accuracy, flexibility and economy when producing threads. . . .

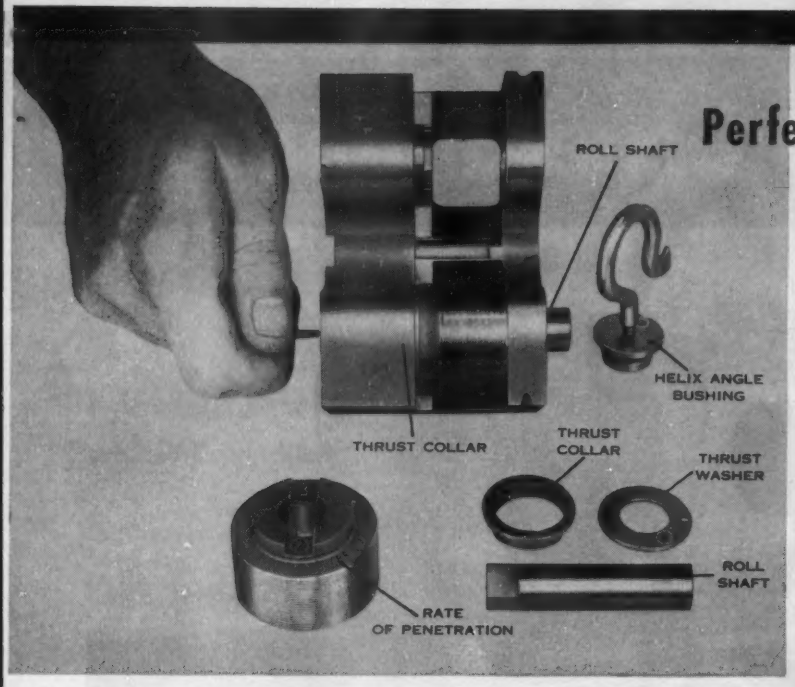
1. *PERFECT HELIX AGREEMENT* allows rolling coarse pitch threads to Class 4 tolerances with long roll life. Threads can also be rolled directly to a shoulder with safety.
2. *ADJUSTABLE DESIGN* provides wide range coverage for each attachment size without loss of rigidity.
3. *SUITABLE SIZES* of LANROLL Attachments have been designed for all types and sizes of automatic screw machines and turret lathes with power feed.
4. *RAPID AND PRECISE SET-UPS* are possible with special gaging methods designed for easy use and the elimination of "cut-and-try" set-ups.
5. Five sizes of Attachments roll a wide range of threads:
   #14—#5 to 3/8"; #18—#5 to 1/2"; #20—3/8" to 1"
   #22—5/8" to 1 1/4"; #24—3/4" to 1 3/4"

Other outstanding advantages of these LANROLL Attachments include: behind-the-shoulder threading; taper correction; and excellent thread finish and microstructure. For additional information ask for Bulletin G-96—please send specifications when writing.

LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A.

423-c



Perfect Helix Agreement

The helix angle bushings, thrust collars, and thrust washers provide a corrective between the workpiece and roll helixes, eliminating drunkenness and ensuring coarse pitch threads to Class 4 fit. All helix angle equipment is designed and marked for rapid changes.

Infinite Size Adjustment

Size adjustment links are used for major adjustments, with final sizing controlled by size adjusting screws. This system, and changing helix angle bushings, assures rolling all threads as though the attachment were exclusively engineered for that particular work.

Precise Timing

A simplified system of roll timing ensures satisfactory rolling on the first operation. Only one gage is used for timing all threads rolled by each attachment. Rolls are correctly timed when roll lines coincide with the vertical of the curved timing gage segment (illustrated).

Low Cost General Purpose

LANDIS

precision grinders

Precision Grinder

Does all these jobs ➡

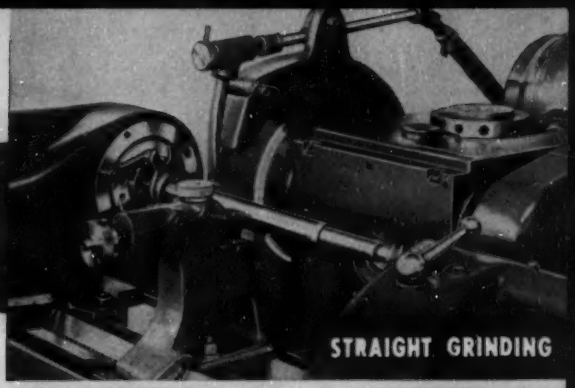
LANDIS 12" x 28" Grindwell
precision cylindrical grinder

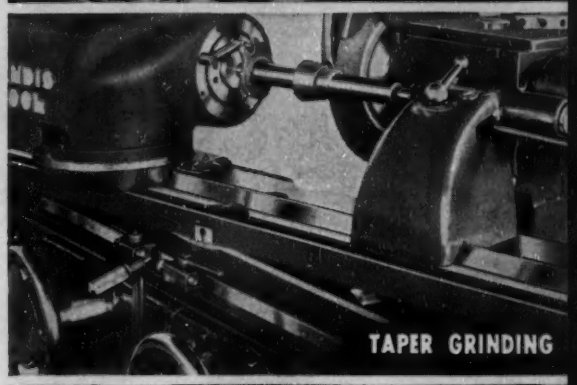
10 money saving features for

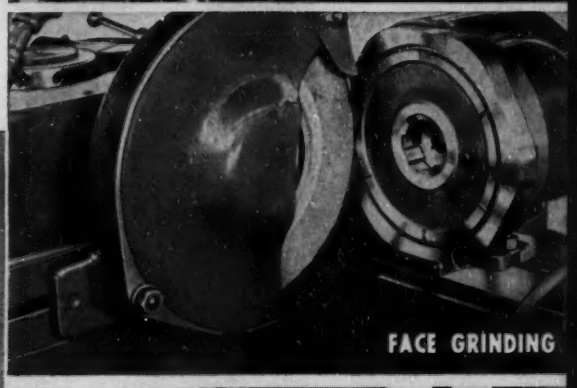
Quick Set-up
Flexible Operation
Precision Grinding
Fine Finishes

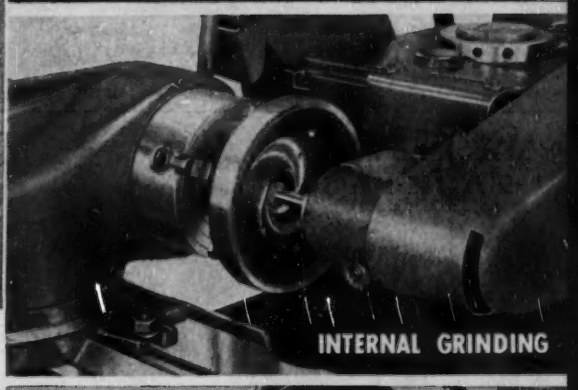
1. Microsphere wheel spindle bearings
2. Variable infinite speed headstock
3. 12" swing—28" between centers
4. Live and dead spindle headstock
5. 12" diameter grinding wheel
6. Coolant pump and integral coolant reservoir
7. Two speed hand traverse
8. Precision coarse or fine wheel feed
9. Four speed power traverse
10. Swiveling headstock, wheel base and work table

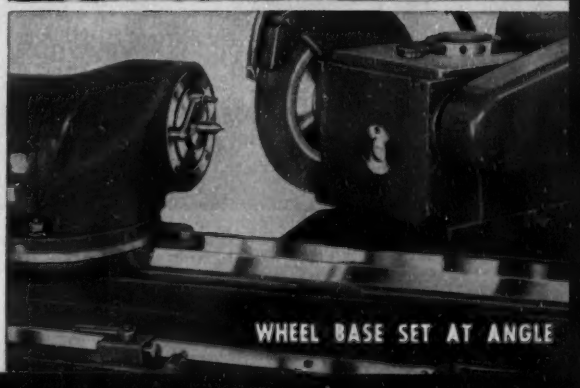
LANDIS TOOL COMPANY
WAYNESBORO, PENNA., U. S. A.


STRAIGHT GRINDING

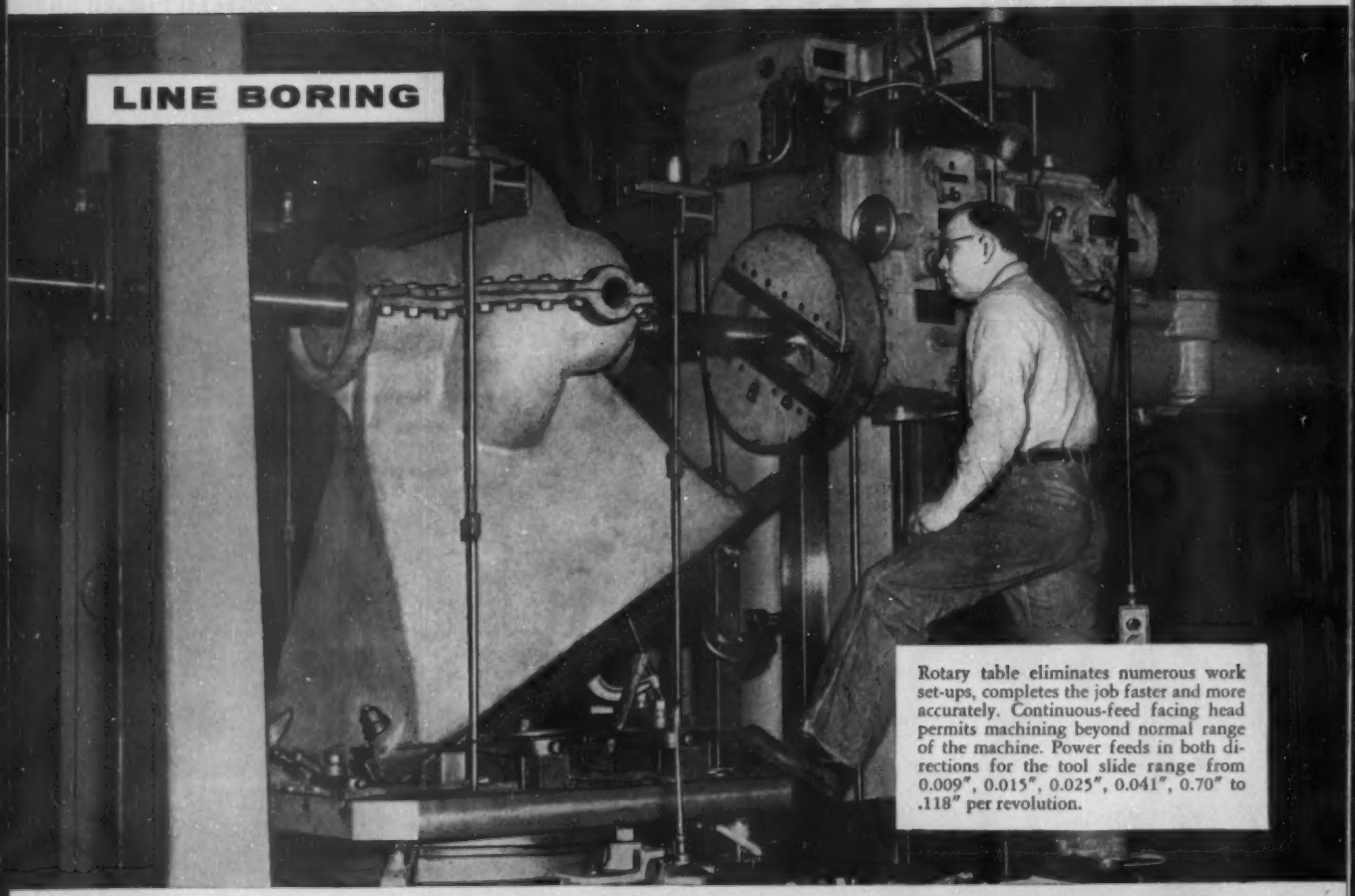

TAPER GRINDING


FACE GRINDING

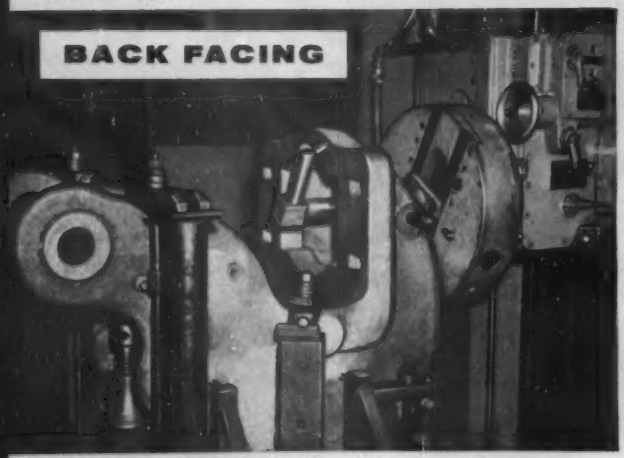

INTERNAL GRINDING


WHEEL BASE SET AT ANGLE

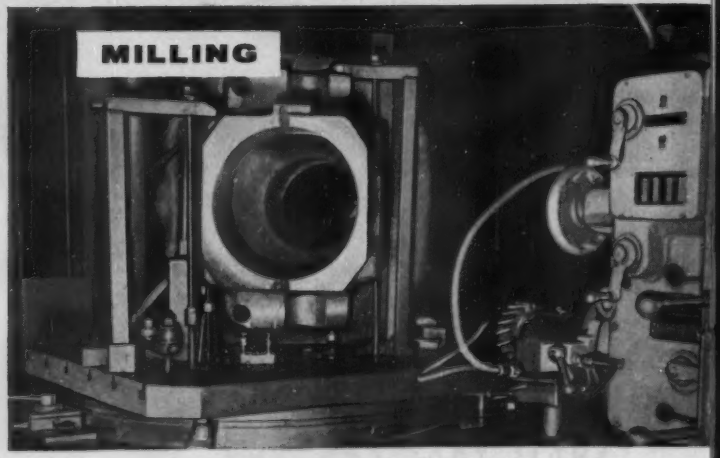
Look at all the operations performs with a



Rotary table eliminates numerous work set-ups, completes the job faster and more accurately. Continuous-feed facing head permits machining beyond normal range of the machine. Power feeds in both directions for the tool slide range from 0.009", 0.015", 0.025", 0.041", 0.70" to .118" per revolution.



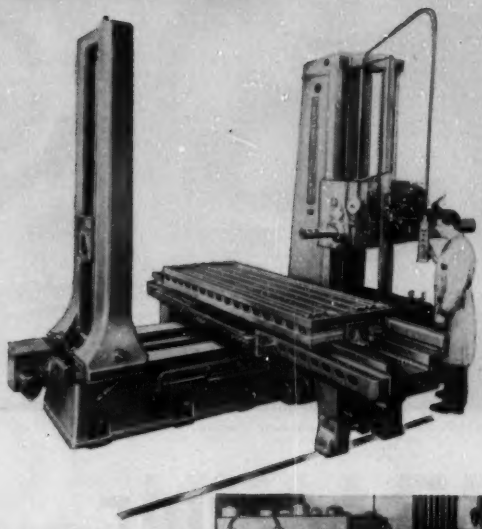
Telescopic tool holder extends through bore in workpiece to hold cutter for back facing operation.



Face milling cutter can be mounted quickly. For angular milling a G&L attachment can be used.

Wilmot Fleming single G&L machine

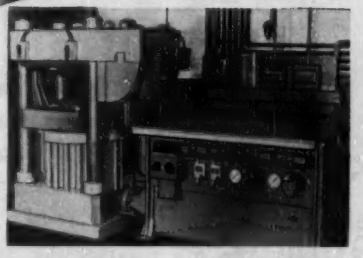
Here's how to tool-up and set-up workpieces to boost production and profits with a Giddings & Lewis 340-T horizontal boring, drilling and milling machine



Most versatile and busiest machine in the shop of Wilmot Fleming Iron & Steel Co., Philadelphia, Pa. — that's the Giddings & Lewis Model 340-T, horizontal boring, drilling and milling machine. Its ability to increase production, save many man-hours and boost profits, permits this manufacturer to perform a considerable amount of subcontract work. This is in addition to production machining of their own product lines.

With G&L's continuous-feed facing head, rotary table and 45 spindle speeds that are easy to select and change, the Model 340-T enables the operator to perform a broad range of machining operations . . . apply heavier cuts and faster cutting speeds.

Compare this 30 Series machine with any other in its class! You'll discover that feature-for-feature — dollar-for-dollar — you can't buy better.

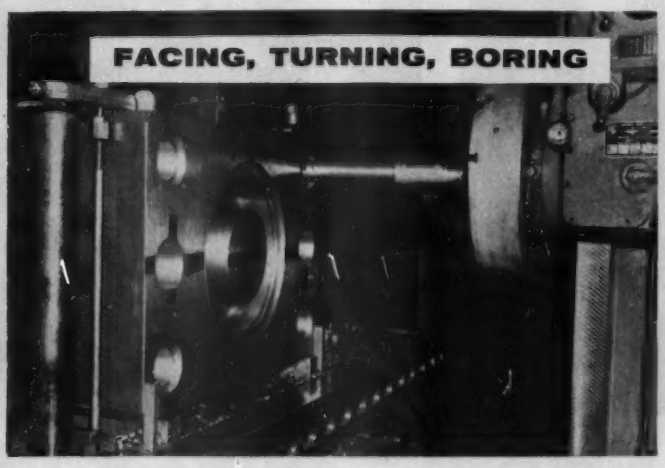


Large and small components of Wilmot Fleming's hydraulic press are precision-machined on G&L's 340-T.

Builders of the world's finest heavy-duty machine tools — Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Openside Planers; Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.

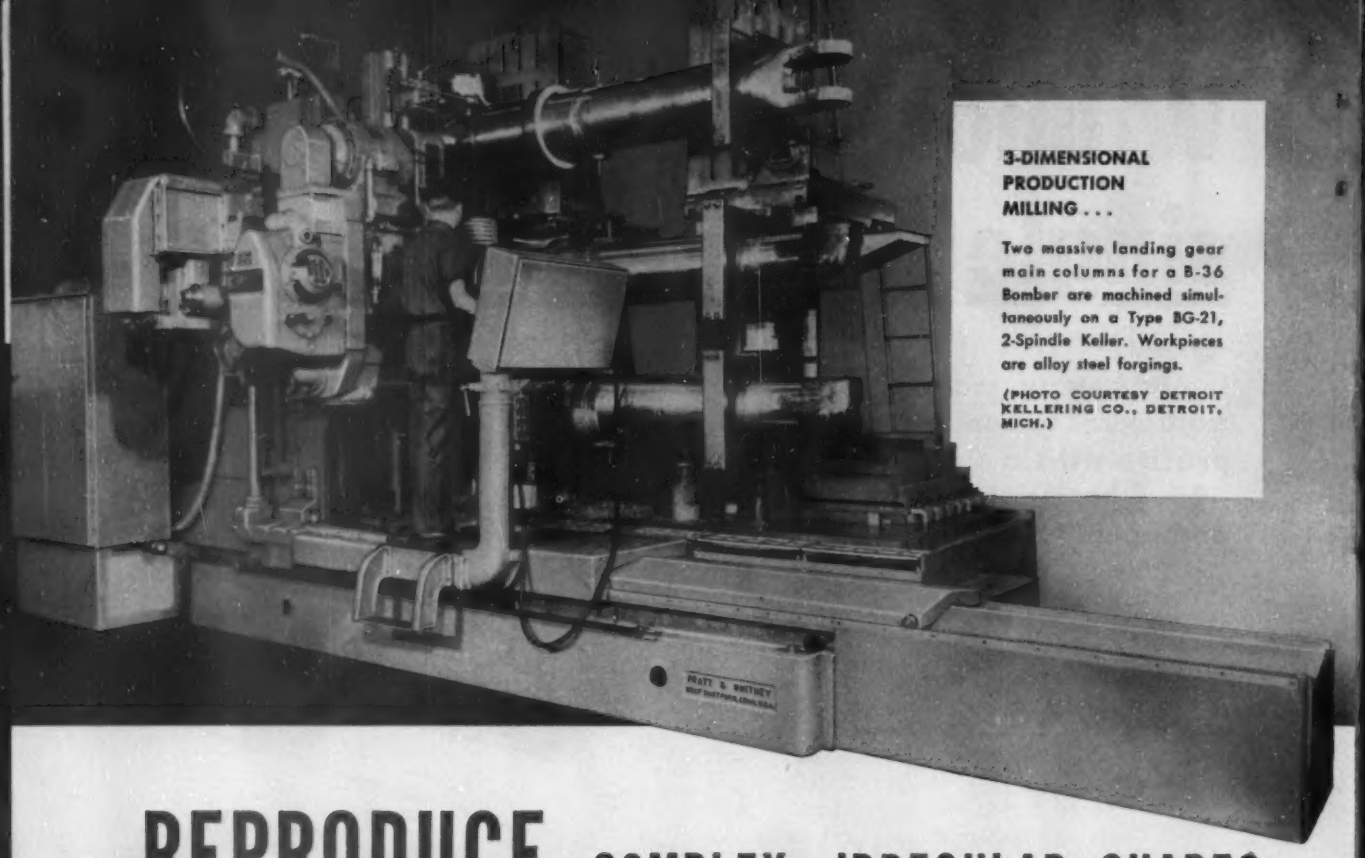
GIDDINGS & LEWIS MACHINE TOOL CO.

FOND DU LAC, WISCONSIN



With a continuous-feed facing head, facing, turning and boring operations are performed on one set-up.

True directional control for contour milling is accomplished manually or through power feed.



3-DIMENSIONAL PRODUCTION MILLING . . .

Two massive landing gear main columns for a B-36 Bomber are machined simultaneously on a Type BG-21, 2-Spindle Keller. Workpieces are alloy steel forgings.

(PHOTO COURTESY DETROIT KELLERING CO., DETROIT, MICH.)

REPRODUCE COMPLEX, IRREGULAR SHAPES

METAL FORMING AND DRAWING DIES • FORGING DIES • PLASTIC MOLDS
RUBBER MOLDS • DIE CASTING DIES • METAL PATTERNS • CAMS
PROTOTYPE WORK • PRODUCTION MILLING • AND MANY OTHER JOBS

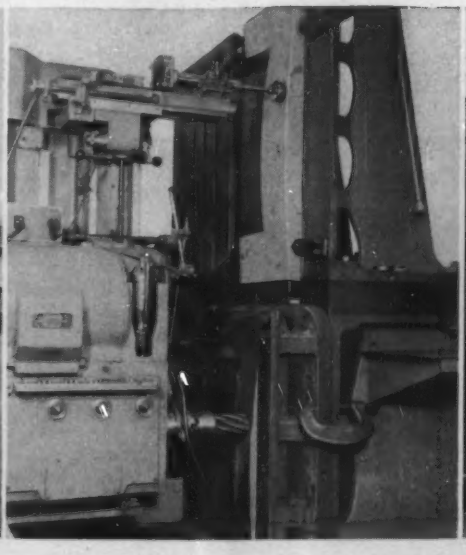
MODERNIZE with PRATT & WHITNEY REPLACE FOR PROFIT

faster and more economically

DIE CASTING DIE . . .

to produce metal shrouds for 25 hp outboard motors. Cavity was deep, intricate, and involved heavy metal removal. Cavity was completely Kellered in only 219 hours on a BG-21 Keller.

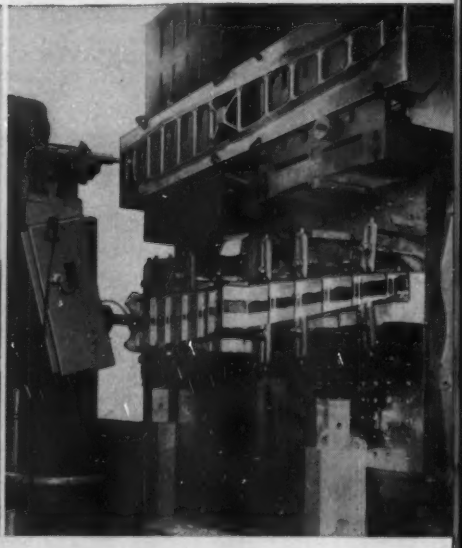
(PHOTO COURTESY ATOLS TOOL AND MOLD CORPORATION, CHICAGO, ILLINOIS)



DRAW DIE . . .

for a motor truck cab door, approximately 48" x 70". The complete job was produced quickly and economically on a Pratt & Whitney Type BG-21 Keller Machine.

(PHOTO COURTESY BUFFALO TOOL & DIE MFG. CO., BUFFALO, N.Y.)



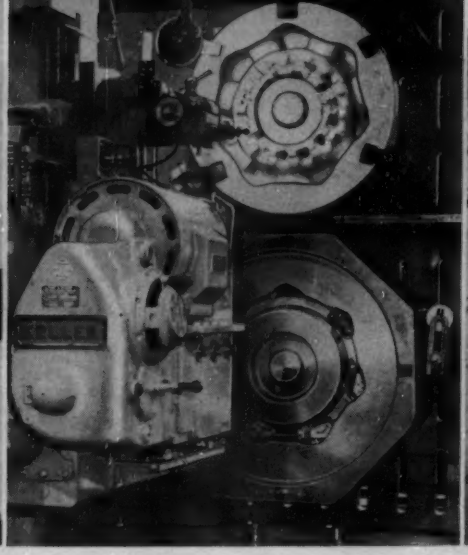
PROFILE MILLING . . .

an aluminum aircraft wing spar is fast and easy with "Kellering." The only template usually required for this type of work is a simple, 2-dimensional template.

BODY FORMING DIE . . .

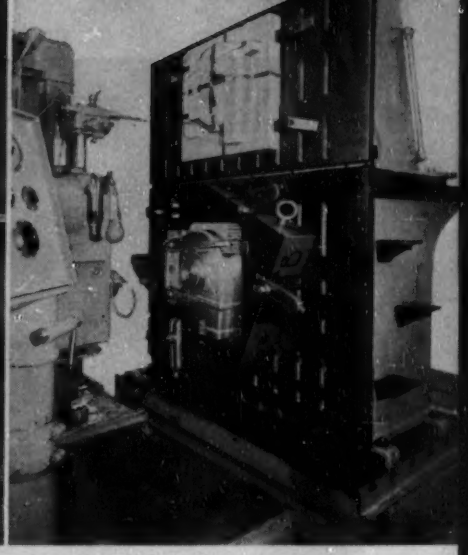
machined by full 3-dimensional tracer-controlled milling from an intricate plaster model. The finished die will be used to form a complete section for the famous Fisher Bodies.

(PHOTO COURTESY SONITH PATTERN WORKS, INDIANAPOLIS, IND.)



FORGING DIE . . .

Using a cement master cast from a wooden pattern, the Keller BG-21 duplicates the complex cavity in an aircraft engine forging die. "Kellering" accuracy on this type of work greatly reduces hand finishing cost.



IMPRESSION DIE . . .

18" x 24" x 4" to produce covers for an 18" rotary lawn mower (trade name "Lawn Boy"). Working from a plaster model, a Type BG-21 Keller Machine does the job rapidly, accurately.

(PHOTO COURTESY JOHNSON MOTORS DIV., OUTBOARD, MARINE & MFG. CO., WAUKEGAN, ILL.)

with PRATT & WHITNEY KELLER TYPE BG-21

Automatic Tracer-Controlled Milling MACHINES

OBTAINABLE IN CAPACITIES FROM: 4 FT. HORIZONTAL X 2½ FT. VERTICAL . . . UP TO 10 FT. HORIZONTAL X 4 FT. VERTICAL.

P&W KELLER Machines are powerful, horizontal spindle milling machines with electric tracer control. They reproduce the shape of any 2-dimensional template or 3-dimensional model accurately and economically; total machining time is much less than that required by other methods. Complicated shapes are duplicated as easily and efficiently as simple ones. The initial job is done more economically, and additional duplicates are produced at a fraction of the usual cost and time.

Keller Machines are designed and built *specifically* for tracer-controlled milling . . . not just "adapted" . . . and can take on a wide variety of jobs without requiring major adaptation by costly attachments. They are rugged machines that will operate dependably and accurately year after year without expensive maintenance.

IN ADDITION TO THE NEW TYPE BG-21, LARGER AND SMALLER SIZES OF KELLER MACHINES CAN BE FURNISHED.

WRITE NOW FOR COMPLETE INFORMATION

See how P&W Keller Machines can help reduce machining time and costs and increase your profits. Fill in the attached coupon and mail for your free copy of Circular No. 565 that completely describes the versatile new Type BG-21 Keller.

PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.
SINCE 1860

First Choice for Accuracy

BRANCH OFFICES . . . BIRMINGHAM • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DALLAS (The Stanco Co.) • DETROIT • HOUSTON (The Stanco Co.) • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD

MACHINE TOOLS • CUTTING TOOLS • GAGES

PRATT & WHITNEY Division Niles-Bement-Pond Co.
11 Charter Oak Blvd., West Hartford 1, Conn.

PLEASE SEND MY FREE COPY OF CIRCULAR NO. 565.

*NAME*_____

*POSITION*_____

*COMPANY*_____

*CO. ADDRESS*_____

*CITY*_____ *ZONE*_____ *STATE*_____

You can spot productive hands by the

Behr-Manning abrasives boost production all along the line...

Handy rolls of BEHR-MANNING® METALITE Cloth offer the machinist his choice of tear lengths for each need.

company they keep . . .

Surface preparation gets a lift with Behr-Manning® abrasive discs

IN the hands of your operators, these flexible, even-cutting SPEED-WET® METALITE® FIBRE DISCS produce top finishes in record-breaking speed. The abrasive, the bond and the backing all combine to insure this performance. Put them to the test.

In Canada: Behr-Manning (Canada) Ltd., Brantford.
For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.

Long-lasting BEHR-MANNING Abrasive Belts assure a fast, more aggressive rate of cut on stock removal jobs.

Polishing narrow recess in die, with a BEHR-MANNING METALITE Cloth SPIRABAND® on portable tool.

Write for the Disc Grinding Bulletin

It's full of good hints for better abrasive disc usage.

Address Behr-Manning, Troy, N. Y., Dept. AM-11

BEHR-MANNING® CORPORATION
division of NORTON Company

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE-SENSITIVE TAPES

G-11

Announcing...*the* NEW

Kearney & Trecker

3 hp No. 2 — 7½ hp No. 3

Model CE

plain and universal milling machines

Designed specifically for EFFICIENCY, EASE and ECONOMY of operation

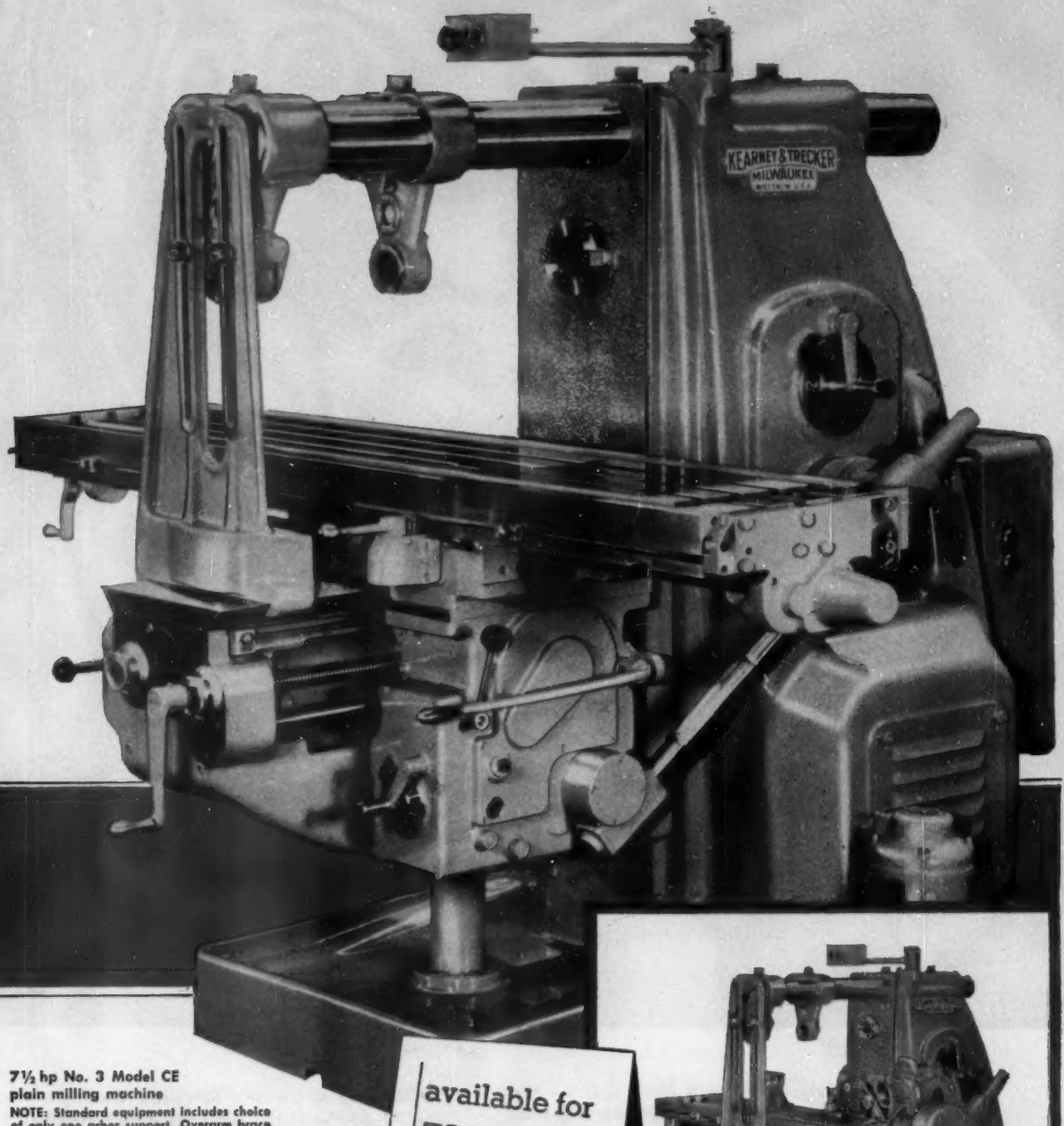
HERE'S Kearney & Trecker's answer to industry's need for a new milling machine that combines quality with *low initial cost*. The new Model CE's give you the three most wanted features — *Efficiency, Ease* and *Economy* of operation. What's more, these machines can be obtained under Tool-Lease.

The economical Model CE's are available in either No. 2 (3hp) or No. 3 (7½hp) size — both in plain and universal styles. The CE's feature 16 quick-change speeds (25 to 1300 rpm) and feeds (½ to 25 ipm). They are ideally suited for a wide variety of applications — especially for small tool shops, repair and maintenance shops and vocational training schools.

For the full story, contact your nearest Kearney & Trecker representative, or write: Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wisconsin.

Kearney & Trecker Corporation

MILWAUKEE 14, WISCONSIN



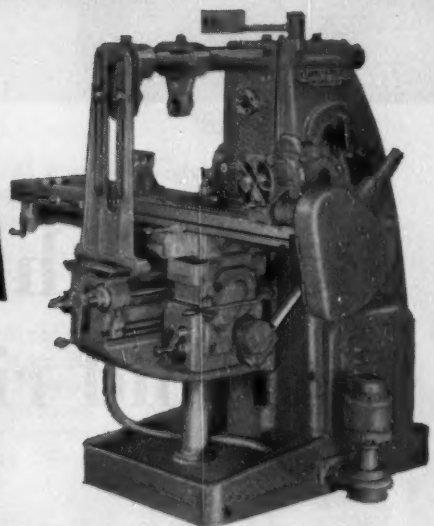
7½ hp No. 3 Model CE plain milling machine

NOTE: Standard equipment includes choice of only one arbor support. Overarm brace available at additional cost.

available for **TOOL-LEASE**

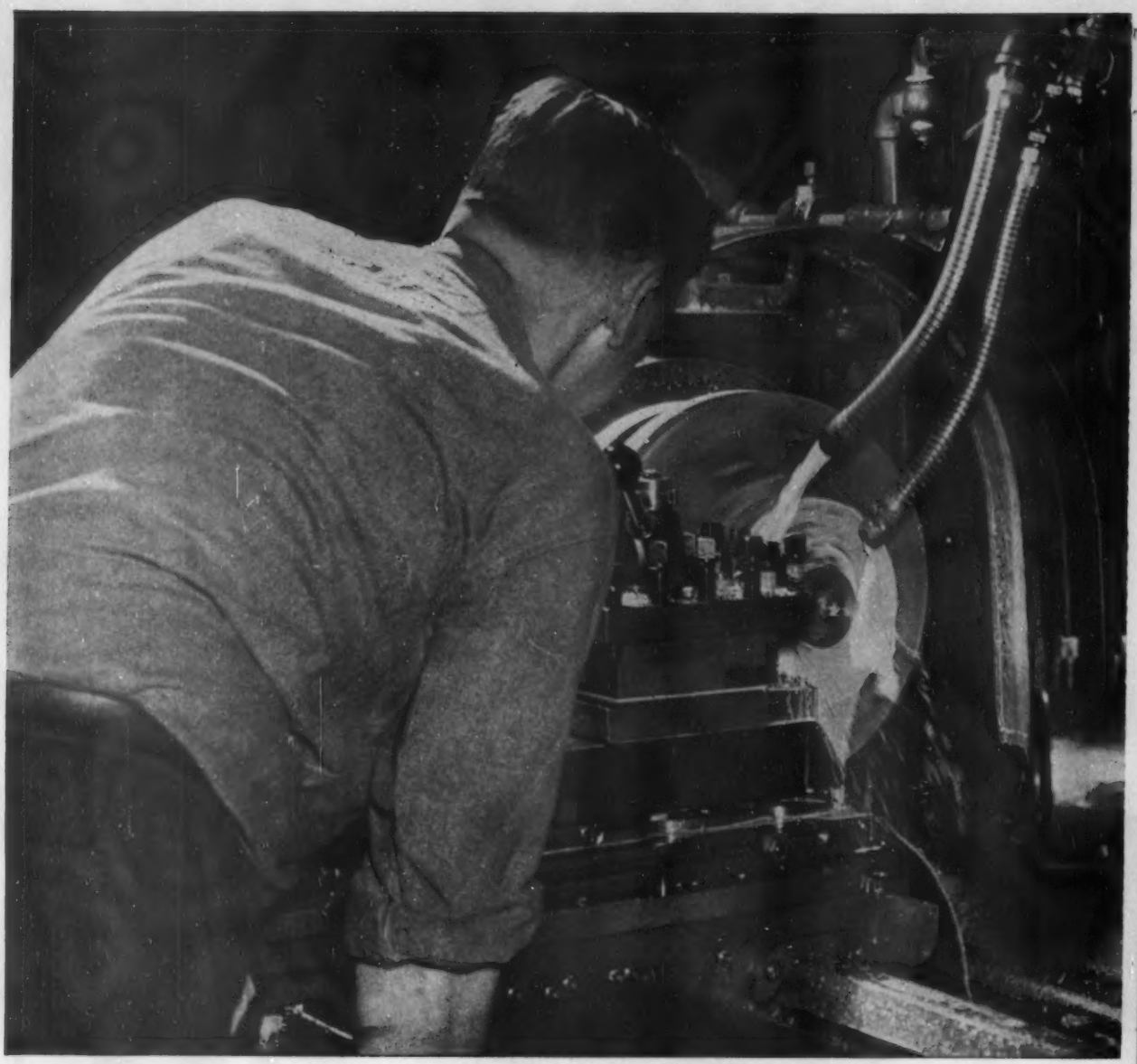
FREE CATALOGS!

Ask for complete data on Model CE milling machines, catalog No. CE-10, and for Tool-Lease bulletin, TL-10A. Also see our catalog in Sweet's. Write or call Kearney & Trecker Corp. — Telephone: GReenfield 6-8300.



3hp No. 2 Model CE universal milling machine

NOTE: Standard equipment includes choice of only one arbor support. Only Conventional Lead Attachment (shown above) is available in Model CE Universal machines. Overarm brace available at additional cost.



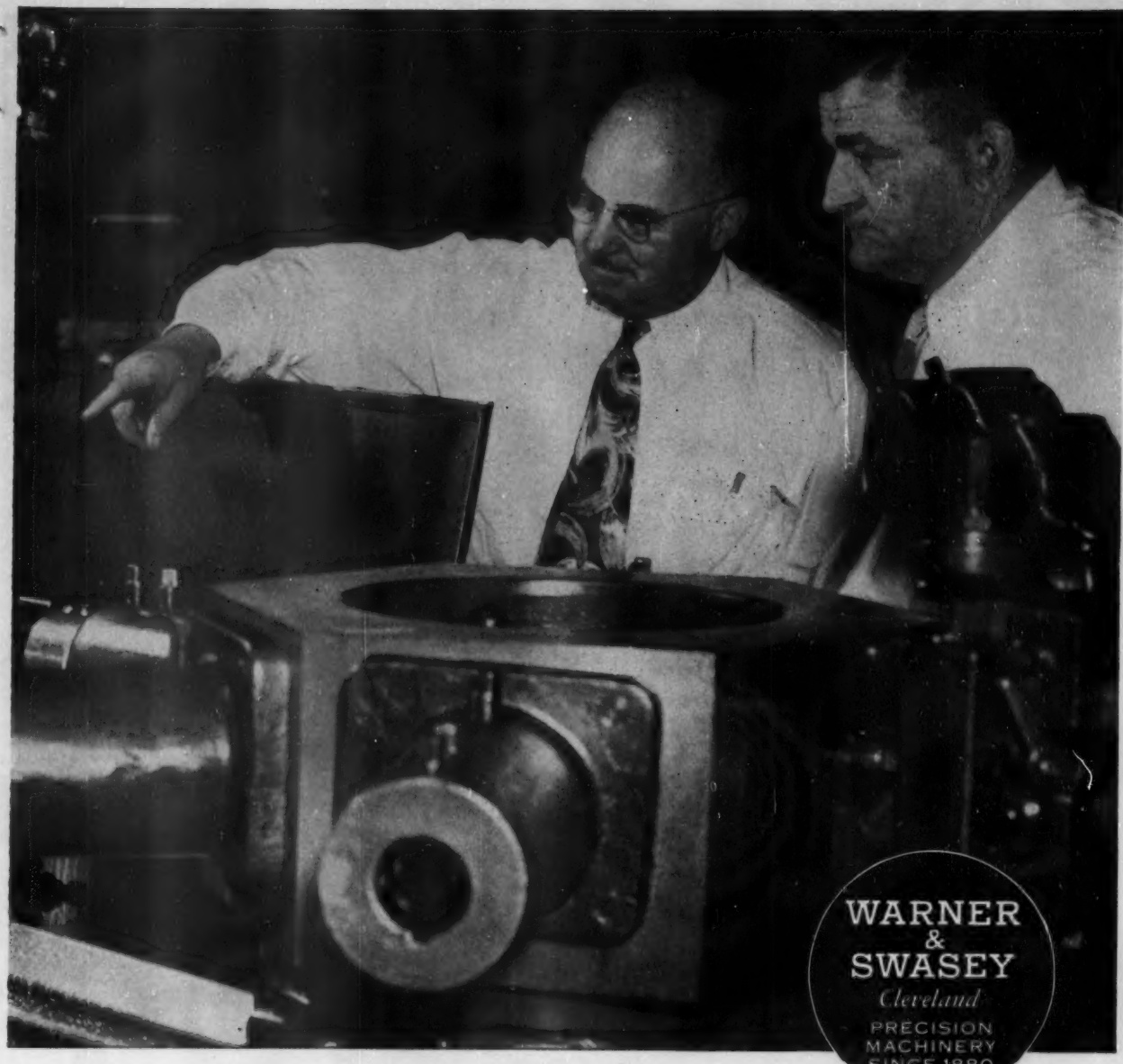
Built right– Sold right

• Warner & Swasey Machine Tools have established enviable records for high productivity, low maintenance and minimum downtime. They've *proved* their dependability – holding their accuracy for years after they have paid for themselves. They're *built right!*

Warner & Swasey's principle of design plays an important role in this success. Each model is *individually designed* – from the floor up – to handle a *specific range of work.* Machine handling time is thus minimized.

Skilled craftsmen, working to exacting

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER &

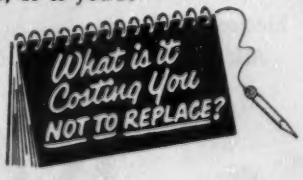


Warner & Swasey standards, combine the most modern machines and processes with certain time-honored hand techniques . . . so necessary to insure the traditional Warner & Swasey accuracy.

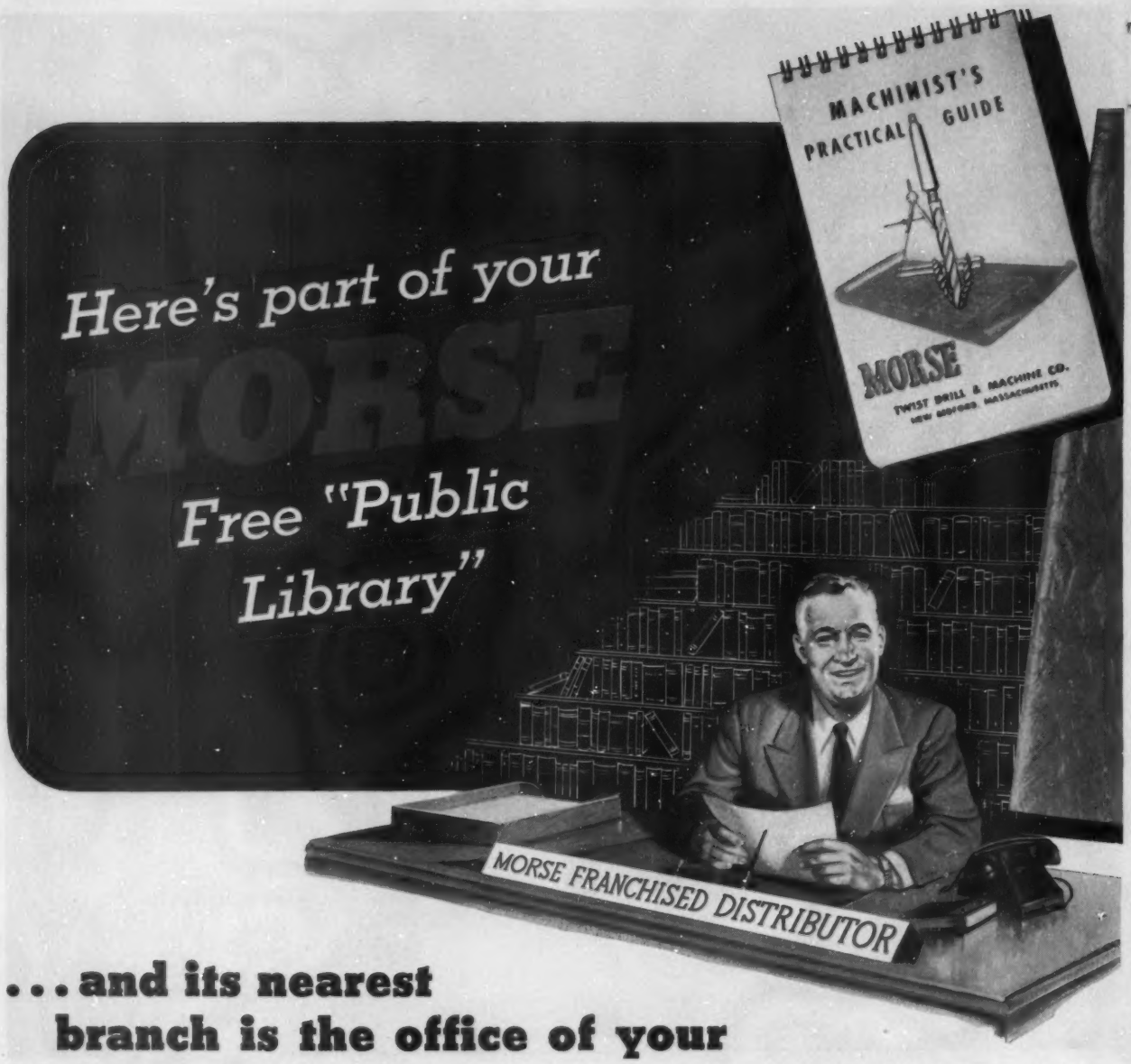
And Warner & Swaseys are *sold right!* By turning specialists who follow a rigid Warner & Swasey policy—that they recommend and sell a machine *only* when it completely fulfills the requirements of your particular work.

These turning specialists are also at your service long *after* the order is written. Your nearest resident Field Representative, one of 47 located throughout the country, is quickly available to you. He's ready to lend his training and experience to help you *maintain* the high productivity of the Warner & Swaseys in your plant.

So whatever your turning needs—whether it's a machine for a specific job, or if you're looking for greater production through modernization . . . call in your nearest Warner & Swasey Field Representative.



SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY



. . . and its nearest branch is the office of your MORSE-FRANCHISED DISTRIBUTOR

Yes, he's your "librarian" for the most useful collection of books in the cutting tool industry. Just as he is your most competent counsel in any problem involving drills, taps, dies, reamers, end mills, counterbores or milling cutters . . . regular or Electrolized.

Ask him for any or all of these useful books . . . *they're free.* And remember that he's best qualified to get you top return for your cutting-tool dollar . . . because he handles and knows the best of all cutting-tool lines . . . MORSE.

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS.
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco

MORSE

Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time

Destined to make an outstanding record in reducing costs . . . . . HyPowermatic

The challenger is here . . . CINCINNATI HyPOWERMATIC . . . the world's finest in heavy duty automatic milling machines. These new machine tools are worthy of the immediate attention of your replacement committee. ¶ New CINCINNATI HyPOWERMATICS are built in 42 sizes, plain and duplex styles, 36" to 168" table traverse, up to 50 hp drive. Outstanding time and effort saving features include Dynapoise overarm, Hydramech table drive, backlash eliminator, automatic spindle stop. More details in catalog No. M-1871. Write for your copy today.

NEW CINCINNATI MILLING MACHINES

CINCINNATI No. 420-184 HyPowermatic Milling Machine with Automatic Quill Retraction.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

If **WEAR**
is a factor...

...use

VK CARBIDE PLUG GAGES

TUNGSTEN CARBIDE
wire type .016" to .500" diameter
CHROME CARBIDE
taper insert type .500" to 1.510" diameter

In addition to its regular line of tungsten carbide wire type plug gages from .016" to .500" diameter, The Van Keuren Company now offers a new line of chrome carbide taper insert plug gages in the range from .500" to 1.510" diameter.

Van Keuren tungsten carbide wire type gages have proved their worth on thousands of tough gaging jobs. The new chrome carbide taper inserts (Carboloy, grade #608*) promise to be equally effective. Wearing qualities of chrome carbide are comparable with tungsten carbide. In addition, the material is lighter than tungsten carbide and has a coefficient of expansion close to that of steel . . . both of which factors are a distinct advantage in the larger sizes.

* Trademark of the Carboloy Dept. of General Electric Company.

Finish on Van Keuren gages in either tungsten carbide or chrome carbide will average .5 RMS or better. These gages are available in Class Y, X, and XX accuracies at moderate prices and on a reasonable delivery basis.

Send for a copy of the 220-page Van Keuren Catalog and Handbook No. 35 containing valuable technical and engineering information on measuring problems and methods. Address: The Van Keuren Co., 173 Waltham St., Watertown, Mass.

VK
35th YEAR

THE *Van Keuren* CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

Another Unusual Application of Gardner Abrasive Discs

Selecting an abrasive for grinding rough concrete floors was a problem recently faced by Whiteman Manufacturing Company of Los Angeles. Their line of cement floor surfacing machines must hold up under conditions of heavy stock removal.

The Gardner #16 grain, deep corrugated YELLOW-RIM WIRE-LOKT disc proved the solution to this problem by providing the required combination of heavy cutting plus long life.

Solving problems like this is the job of the Gardner Abrasive Engineer. Call him for help on your grinding jobs. Gardner Machine Company, 410 Gardner Street, Beloit, Wisconsin, U.S.A.

123A

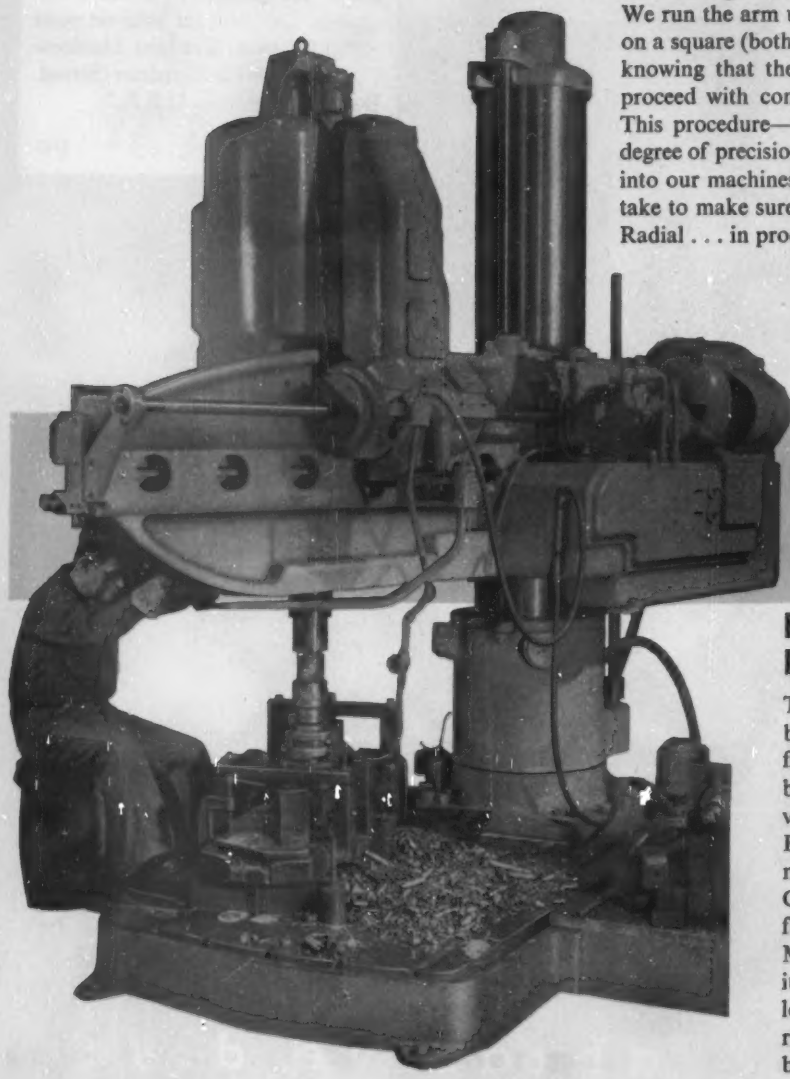
GARDNER

abrasive discs

Here's another reason it pays to get a proposal from Fosdick

Fosdick aligns the column

Radial alignment at Fosdick starts with the column. We run the arm up and down with an indicator bearing on a square (both lengthwise and across the base). Then, knowing that the column is square with the base, we proceed with conventional tramming and sweep tests. This procedure—used only by Fosdick—adds an *extra* degree of precision to the extra rigidity we have designed into our machines. It's another example of the pains we take to make sure you get the most out of your Fosdick Radial . . . in production, tool life, finish, tolerance.



Fosdick Hydraulic Radials are available with 3' to 8' arms, 11" to 19" columns. For full information, ask for Bulletin **HRM.**

to give you

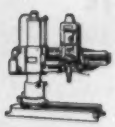
Fosdick takes a "bite" out of boring time at Owen Bucket

Tough cast-steel hinges for clamshell buckets are bored to ± .001" for a press-fit cast iron bushing—then counterbored for a washer. For this and a variety of other heavy-duty drilling, Fosdick's proposal on a 5' 17" Radial made sense. Now Owen Bucket Co. of Cleveland gets 10 pieces in the time formerly needed to produce 7. As Frank Matisak, General Superintendent puts it, "... now we can do more pieces with longer tool life—this machine is more rigid, giving us closer tolerances and better finish."

First

precision production like this

Need Drilling Equipment? Get a Proposal from Fosdick!



Radial Drills

Jig Borers

Sensitive and Upright Drills

Sensitive Radial Drills

Automatic Positioning Machines

FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

An Outstanding Advance
in PLUNGE FORM GRINDING

Sets New Records for Production and Accuracy . . . Reduces Costs . . . Replaces Other Methods for Producing a Great Variety of Work! Note These Advanced, In-Built Features!

- **Completely automatic cycle** — High speed approach, wheel feed spark out and withdrawal are positively controlled through simple cam action — ensuring constant, uniform operation under all conditions.
- **Automatic positive size control** — The wheel slide is held against positive stops with uniform hydraulic pressure.
- **Automatic trueing device** with controlled dressing.
- **Automatic or manual handling.**
- **Complete versatility** — chucking work, center work or shoe-type grinding; crush wheel or diamond trueing.
- **Compact design** — affords exceptional accessibility and simple set-ups.

Write for illustrated folder — gives complete specifications and examples of how the Model "E" does jobs faster, better and more economically.

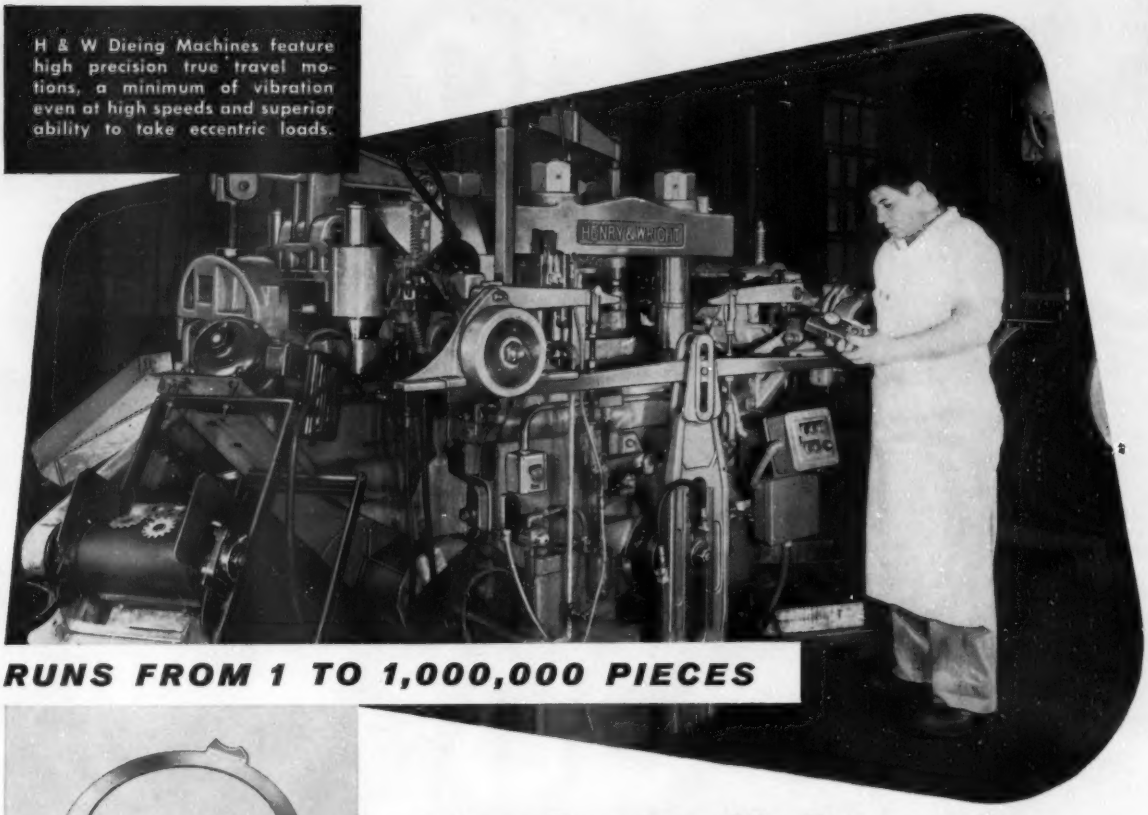
JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

J&L MACHINE TOOL DIV.

H & W Dieing Machines feature high precision true travel motions, a minimum of vibration even at high speeds and superior ability to take eccentric loads.



RUNS FROM 1 TO 1,000,000 PIECES

Parts like these, and three changeovers per day, too!

and nothing is made for stock

Production runs are from 1 to 1,000,000 pieces. Alloys, stock sizes, toolings differ for nearly every run. Yet Henry & Wright Dieing Machines in the plant of Wallace Barnes Company, Bristol, Conn., take care of this with nary a need to carry any of the production in stock.

Tooling changeovers are quick. Hence, deliveries are quick.

Precision is high. Hence, spoiled work scrap is low.

Some of the alloys are tough, others are highly workable. Some of the shapes are intricate, others are simple. None of the dies are "special for these machines"; all will fit any presses of sufficient tonnage in the shop.

Two, and even three, die changes are made per shift with no trouble at all. Henry & Wright Dieing Machines displaced five "conventional" ones.

Could your shop use a production method that is as simple, certain and smooth as this one? Would you like machines that can eliminate shelf inventory as a necessity for quick deliveries?

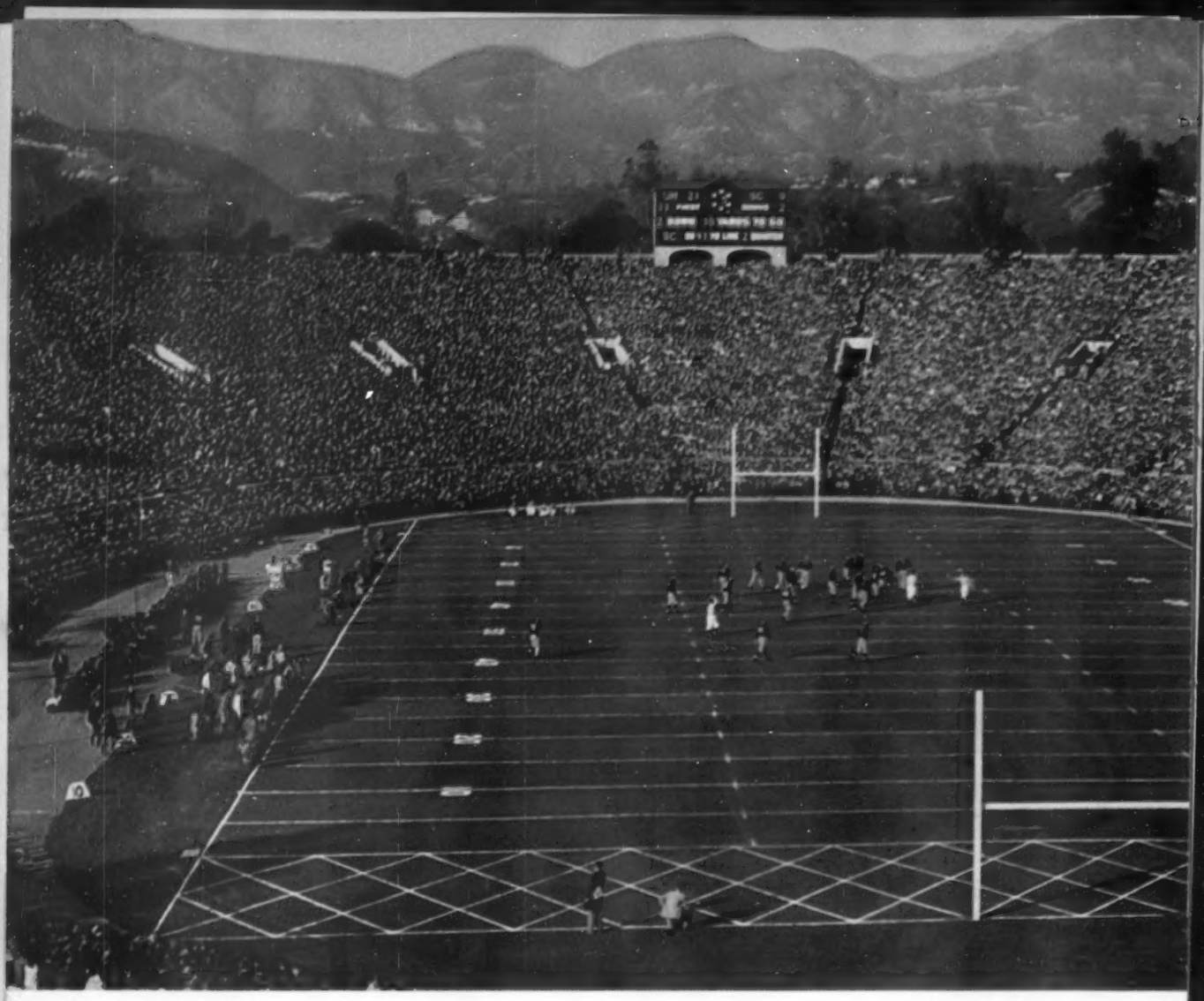
There is a lot more to the story. Please let us tell you all about it. Write to Henry & Wright, Division of Emhart Mfg. Co., 481 Windsor St., Hartford, Conn.

H & W Dieing Machines are available in capacities from 25-ton to 2500-ton.

HENRY & WRIGHT

Division of Emhart Mfg. Co.

HARTFORD, CONNECTICUT



Rose Bowl, Pasadena, California

Shostal Press Agency Photo

BULLARD

The Invisible Background of Industrial Progress

Americans are sports-loving and sports-minded people. Our interests vary, as participants or spectators and include baseball, golf, football, soccer, hunting, fishing, hockey, skating, skiing and many others, too numerous to mention.

Likewise, modern industrial management realizes that improved employee morale, higher efficiency and better community relations are the result of employee recreation programs and warrant their support.

Manufacturers of sports equipment and supplies, builders of stadiums and indoor arenas are users of *Modern Machine Tools* — "The Invisible Background of Industrial Progress."

THE BULLARD COMPANY

Bullard Mult-Au-Matic
Type "D"–8"–12"–16"
with 6 or 8 Spindles.
Also 16–23"

A satisfied customer speaks from experience. The John Waldron Corporation of New Brunswick, New Jersey, manufacturers of a well-known line of precision couplings, have been users of Bullard Mult-Au-Matics for 28 years. Here is what they say:

> "The close tolerances we obtain on our Mult-Au-Matics, regardless of age, will even surprise Bullard. Some of the diameter tolerances are as close as −.001″ +.000″. We have 100% inspection of every finished piece as well as of the assembled unit. We make absolutely sure that these tolerances are maintained.
>
> "Bullard Mult-Au-Matics give us the accuracy we need. I doubt whether any other machine can excel Bullard for continuity of performance — a "must" with rising material and other overhead costs."

These same advantages of precision performance and reliability can be applied to your machining problems *to reduce your costs.* Call your Bullard Sales Office or Distributor — there's one near you — or write to The Bullard Company, Bridgeport 2, Connecticut — phone EDison 6-2511 for complete information.

BRIDGEPORT 2, CONNECTICUT

ARMSTRONG WRENCHES

Choose Your Wrenches as you do your friends--for life

Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less fatiguing. ARMSTRONG Wrenches generally are longer for size—give greater leverage. Accurately milled or broached openings give the proper clearance. They are safe wrenches because they are strong beyond need.

Drop forged and machined from high tensile carbon or special alloy tool steels, ARMSTRONG Wrenches are heat treated, tempered and tested to an exact balance of toughness, hardness and tensile strength. Each is beautiful in finish and line, is a quality tool to be proudly possessed by any mechanic—or certain to "give a lift" to any assembly line. Buy wrenches which carry the trade marks HI-TEN or ARMALOY. On carbon or alloy steel wrenches these trade marks are your guarantee of lifetime quality.

WRITE FOR CATALOG 15

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"
5215 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

On any carbide grinding job...

Nothing cuts like a Norton diamond wheel

Norton Vitrified Bonded Diamond Wheels outperform all others of this type. They combine the fast cutting action of resinoid bonded wheels with resistance to grooving approaching that of metal bonded wheels. Great durability is another advantage.

◀ ***Production Grinding of Single Point Carbide Tools*** is most economical and efficient with Norton vitrified bonded diamond wheels. Grinding chip breakers, as illustrated, is another important job for which they are ideal.

Norton Resinoid Bonded Diamond Wheels combine fast cutting with long, money-saving wheel life that makes them favorites for precision sharpening. Made in two bond types — regular, for wet grinding and B6, for dry grinding. It is always more economical to use each bond type on the applications for which it is best suited.

◀ ***On Your Multi-Tooth Grinding Jobs,*** Norton resinoid bonded wheels hold size so that each tooth gets uniform grinding. The straight, thin shapes make excellent cut-off wheels for salvaging damaged carbide tools.

Diamond wheels in carbide grinding more than pay for themselves. "It's like finding money."

You can cut grinding time — and grinding costs — to the lowest possible by standardizing on Norton diamond wheels.

As a result of Norton Company's long pioneering† in diamond wheel development, Norton diamond wheels bring you a combination of long service life and efficient cutting action that means maximum economy — across the entire range of carbide grinding applications.

Besides the vitrified and resinoid bonded types shown here, Norton diamond wheels are also available in a metal bond — where durability and resistance to grooving, rather than a fast rate of cut, are primary considerations. For every application the proper size and type of Norton wheels are available in a wide variety of grit sizes.

NOTE: For small-volume carbide grinding requirements, especially in single-point applications, Norton K Bond CRYSTOLON* *wheels are often the best investment. Their high stock removal rate and uniform performance assure quality grinding at lowest cost. And they are made in half-grade increments of hardness, enabling you to "pin-point" your specifications.*

See Your Norton Distributor

for aid in selecting the right Norton wheels for every grinding job. And ask him for the 142-page, illustrated booklet: "Grinding Carbide Tools." Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. Listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

W-1581

Making better products... to make other products better

NORTON

and its **BEHR-MANNING** *division*

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

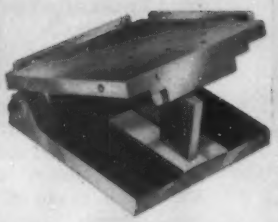
*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

†First with resinoid bonded, first with metal bonded, first with vitrified bonded diamond wheels.

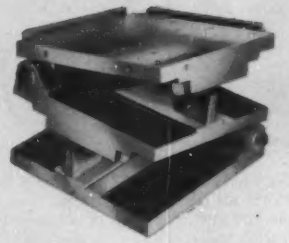
Some Simple Ways To Set An Angle

with Taft-Peirce Sine Checking Equipment

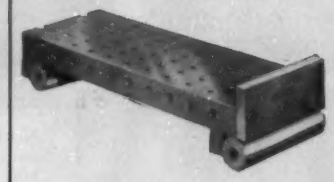
For Setting Up



T-P SIMPLE SINE ANGLE PLATE
is a convenient new device for setting up any angle from 0 to 90 degrees. A .1000″ step on base provides for obtaining angles requiring a setting smaller than .1000″. For grinding, light drilling, inspection operations.

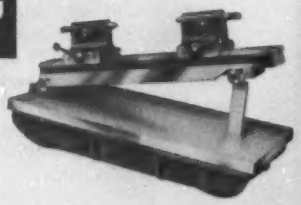


T-P COMPOUND SINE ANGLE PLATE
permits angular setup in two planes simultaneously. Just clamp part to tapped holes. Set angles with gage blocks. Tighten lockscrews to secure plates. Has same 6″ x 6″ base as Simple Sine Angle Plate.



T-P SINE BLOCKS
combine the features of a sine bar with a right angle iron. Tapped holes on all working surfaces facilitate clamping. Top surface parallel within .0001″ to center line of sine plugs. 6″ and 10″ lengths standard. Specials to order.

For Checking

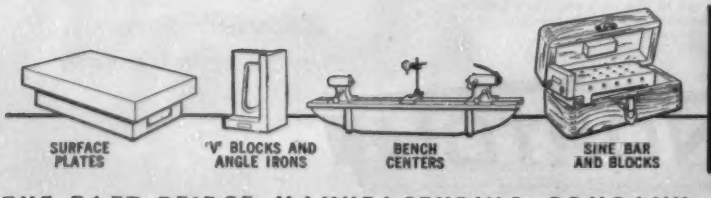


T-P SINE BLOCK TAPER TESTING FIXTURE
combines a 20″ sine bar with pair of adjustable precision centers. Base is 14″ x 24″ precision surface plate fitted with adjustable end stop. Can check tapers up to 15″ long and 6″ in diameter.

T-P SINE BAR FIXTURE
puts sine bar on pivot. Pivot end may be raised or lowered independently of angle setting. Knurled-headed screws on pivot arm provide fine, accurate angular adjustment of bar. Available with 5″ or 10″ sine bar.

T-P SINE BARS
are used for measuring angles precisely or for locating work to a given angle within very close limits. Center line of sine buttons held accurately parallel to upper and lower face of bar. 3″, 5″, 10″, and 20″ standard lengths.

For more complete details on these and many other Taft-Peirce products, send for your copy of the Taft-Peirce Handbook.



T-P means Top Precision

T P

THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, RHODE ISLAND

"AMERICANS" WORKING FOR NORDBERG

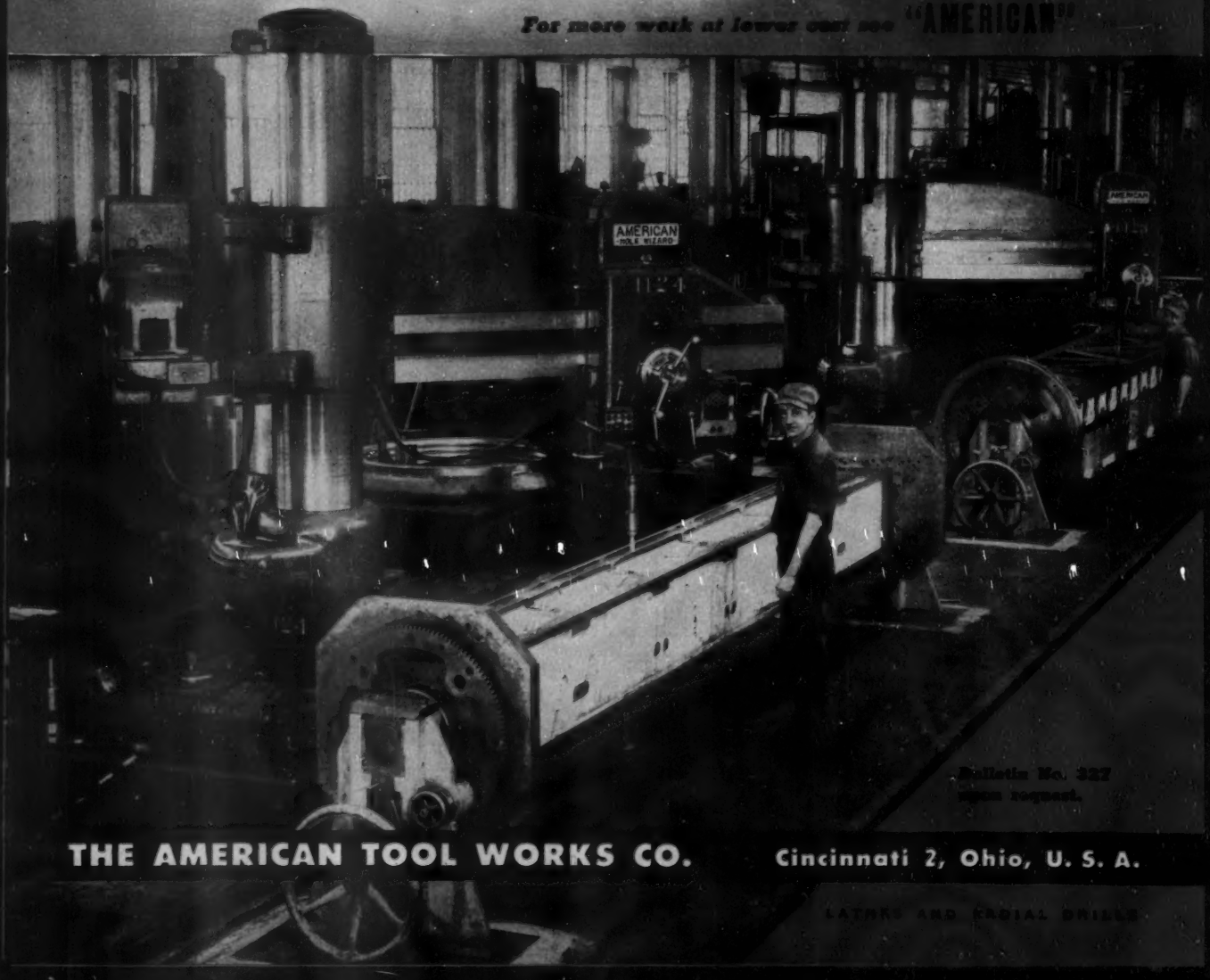
helping to profitably produce the quality products for which Nordberg Manufacturing Company of Milwaukee, Wisconsin is known the world over.

These "AMERICAN" Track Type Hole Wizard Radials mounted on mobile bases speed up drilling, tapping and boring operations in long, heavy work pieces by bringing the tool to the work rather than moving the work to the tool.

The work pieces are mounted in elaborate trunnion jig fixtures so different work planes may quickly be presented to the tool and a high degree of accuracy maintained.

The quality of Nordberg products is universally recognized. We are proud indeed that so many "AMERICAN" Lathes and Radial Drills contribute to it.

For more work at lower cost use **"AMERICAN"**



Bulletin No. 327 upon request.

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

Of Course

You'll get from your Taps the *accuracy* and *long life* that Winter has designed and built into them.

So of Course

You'll order Winter Taps with

BALANCED Action

CALL YOUR WINTER DISTRIBUTOR

Your local Industrial Supply Distributor carries a complete stock of WINTER Balanced Action Taps

WINTER

WINTER BROTHERS COMPANY
Rochester, Michigan, U.S.A.
Distributors in principal cities. Branches in New York Detroit • Chicago • Dallas • San Francisco • Los Angeles
Division of National Twist Drill & Tool Co.

EXACT FLUTE SPACING

UNIFORM FLUTE CONTOURS

PRECISION CHIP DRIVER CONTOURS

ACCURATE AND CONCENTRIC CHAMFERS

NATIONAL TWIST DRILL & TOOL
ROCHESTER, MICH., U.S.A.

National

New National One Piece
Aircraft Drill and Adapter

CALL YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

... for all your staple industrial needs, including NATIONAL twist drills, reamers, milling cutters, end mills, hobs, counterbores, and special tools.

IT'S THE EDGE

that determines your cost-per-drilled-hole

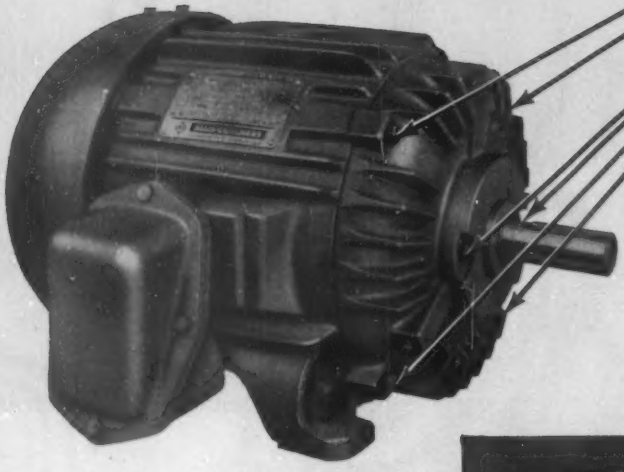
To remove metal at lowest cost use *carefully designed and manufactured* cutting tools. National gives you the edge!

NATIONAL TWIST DRILL AND TOOL COMPANY

Rochester, Michigan, U.S.A. Distributors in principal cities. Factory branches: New York • Detroit • Chicago • Dallas • San Francisco • Los Angeles

It takes Six Bolts—

not just four

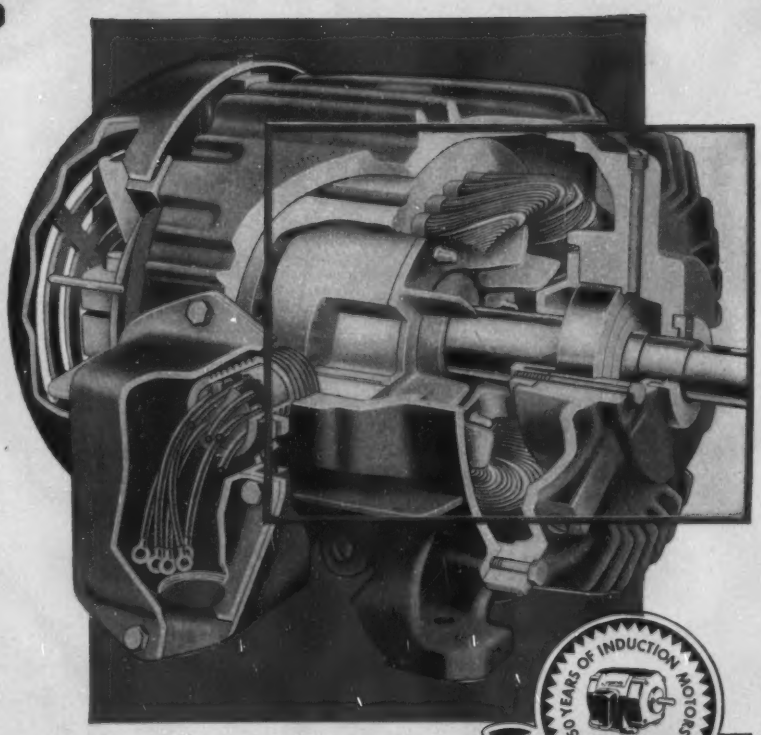


to give full bearing protection for greater motor performance

THE TWO EXTRA BOLTS in the end housing of every Allis-Chalmers ball bearing motor are the proof of *extra* protection against bearing failure. These are the bolts that hold the bearing cap tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure . . . protects the grease and the bearing against contamination from dirt and moisture.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

Result? Allis-Chalmers motors pay off in longer, trouble-free bearing life, lower motor maintenance.



Get all the facts . . . judge for yourself — Compare Allis-Chalmers motors with other motors. Get the six-bolt construction that gives you complete bearing protection. For proof, see your Allis-Chalmers Office or Authorized Distributor, or write — Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-C ALLIS CHALMERS

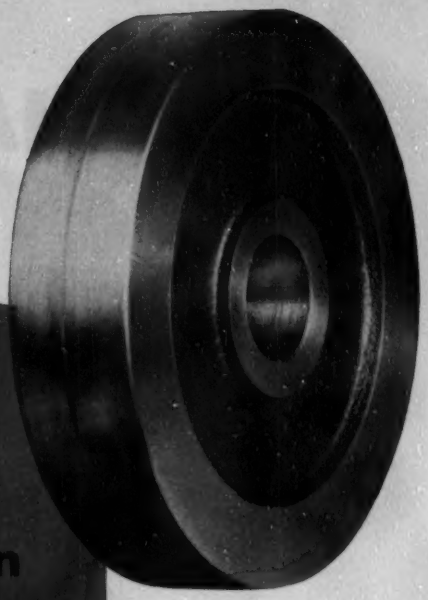
A-4444

OHIO FORGE AND MACHINE

OHIO F&M CO

eliminates two grinding operations

machining high precision diesel engine gear blanks

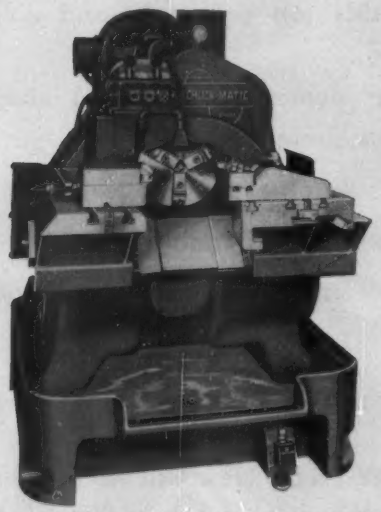


Machined on **CHUCK-MATIC** from A-4340 steel forging annealed.

1st operation: (on front side) Face hub and flange, form radius on O.D; bore and chamfer hole, turn O.D. partway.

2nd operation: (on other side) Face, finish bore and turn O.D. remainder.

ON ACME-GRIDLEY CHUCK-MATICS



Acme-Gridley 12″ Single Spindle CHUCK-MATIC is radically different from any other machine heretofore offered for short length primary operations such as forming, turning, drilling, straight or taper boring, facing, etc.

By switching these jobs to Chuck-Matics, Ohio Forge and Machine Corporation in Cleveland, Ohio, now machine tough forged blanks concentric within .0002″—hold tolerances which eliminate the green (or soft) grinds previously required on bore and O.D. before the teeth could be cut.

And they save, too, with automatic control of cycle time—a predetermined machining rate that you can count on for every piece.

This Radically Different Chucker

is built for high speed precision work on heavy duty jobs. Check these features against your present methods—

- **automatic control of machine time cycle**
- **easy to set up and retool**
- **does not require skilled labor—one man operates as many machines as cycle times of jobs permit**
- **is space saving—only 45″ wide, 64″ long**
- **precision work at speeds and feeds as fast as carbide tools can take it.**

—then write for catalog SC-46. Or, better still, ask us to talk it over.

Nothing so completely destroys profits as the continued use of obsolete equipment

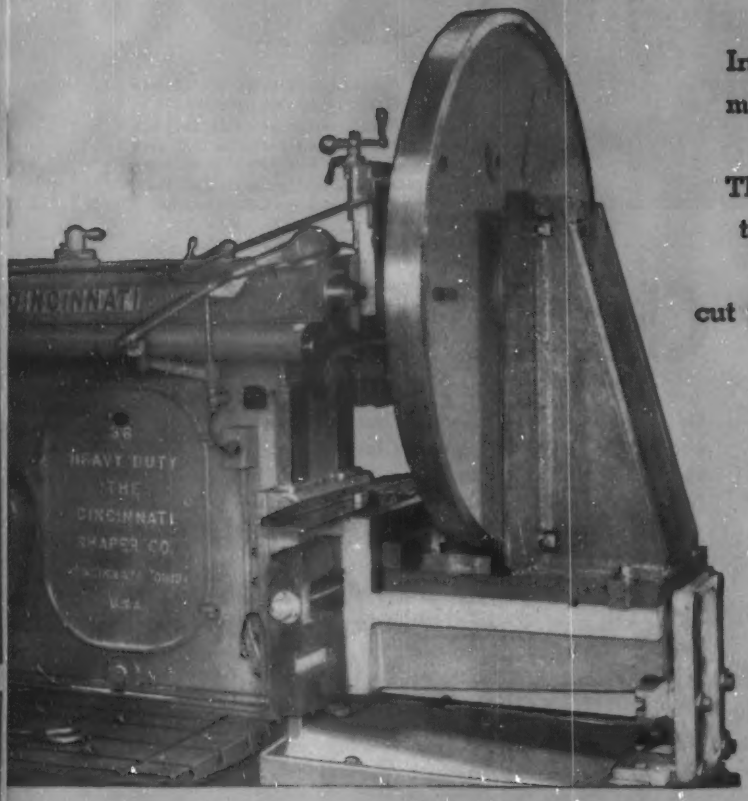
The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS
1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

INTERNAL SHAPING

the LARGE



Internal shaping is the only practical method for many "hard to get at" jobs.

This large job is especially adaptable to this rigid Cincinnati Shaper with "drop" table. Kennedy keyways are cut to .0005" tolerance in this big gear. The low cost fixture and tool make this job profitable and simple.

Other economical internal shaping jobs include—

- Internal oil grooves.
- Internal contouring.
- Internal teeth on special gears.
- Internal guides in gate valves.
- Internal slotting.

Write for New Cincinnati Shaper Catalog N-6.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

job

* The new Electro-Magnetic Clutch and Brake greatly speeds set-up and operation.

Safety Glasses

AO'S **OPTICAL RESEARCH** and **SAFETY EXPERIENCE** make these glasses "easy on the eyes"!

Long experience in optical research, coupled with a practical knowledge of Personal Safety requirements in Industry, enables AO to produce protective eyewear that's not only *safe* but "easy on the eyes". As an example, consider the F4100 Series Metal Ful-Vue Safety Glasses. Good appearance and comfort are "engineered" into them along with Super Armorplate Lenses, new eyewire, rugged endpieces, and other superior features born of careful research. You're protecting your workers with the best — and your pocketbook, too — when you say "AO"! Ask your nearest AO Safety Products Representative.

QUICK FACTS

EYEWIRE — Lightweight, durable. Deep grooves engineered to hold lenses securely.

ENDPIECE — Wide bearing surface makes for strength and long life. Screw heads can't snag.

TEMPLES — Lightweight, easily adjusted, perspiration proof.

BRIDGE — Double-braced.

SIDE SHIELDS—Available with or without side shields that are easy to replace. (Binder and eyewire are one piece.)

Look for the AO trademark for top quality in protective equipment

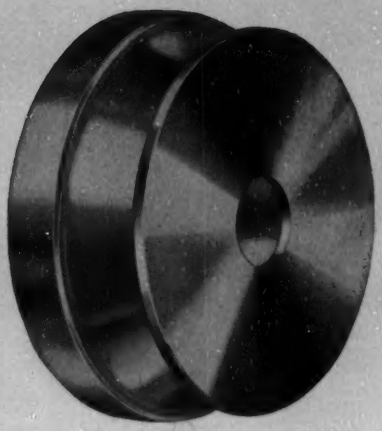
American Optical
SAFETY PRODUCTS DIVISION

AO SAFETY ZONE

Keep your workers in the Safety Zone with American Optical Safety Equipment

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

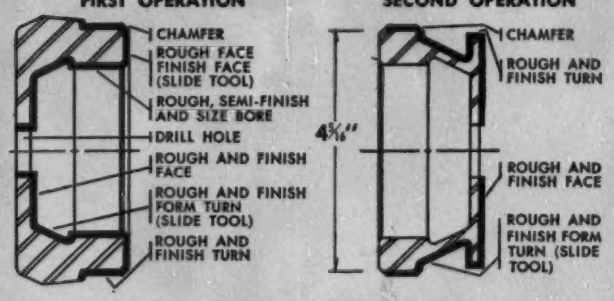
CUTTING SPEEDS OVER 1,000 Feet per Minute on STAINLESS STEEL FORGINGS



WITH THE NEW

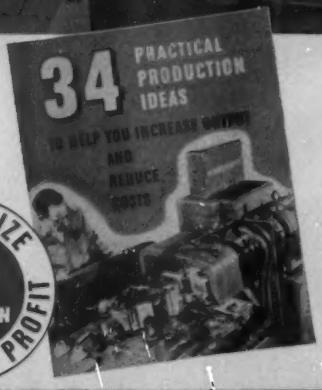
POTTER & JOHNSTON 4-U AUTOMATIC

HERE ARE THE RESULTS!!



HEAVY LINES INDICATE MACHINED SURFACES

FLOOR-TO-FLOOR TIME, 5.54 minutes per piece (for both operations)



MODERNIZE with POTTER & JOHNSTON REPLACE FOR PROFIT

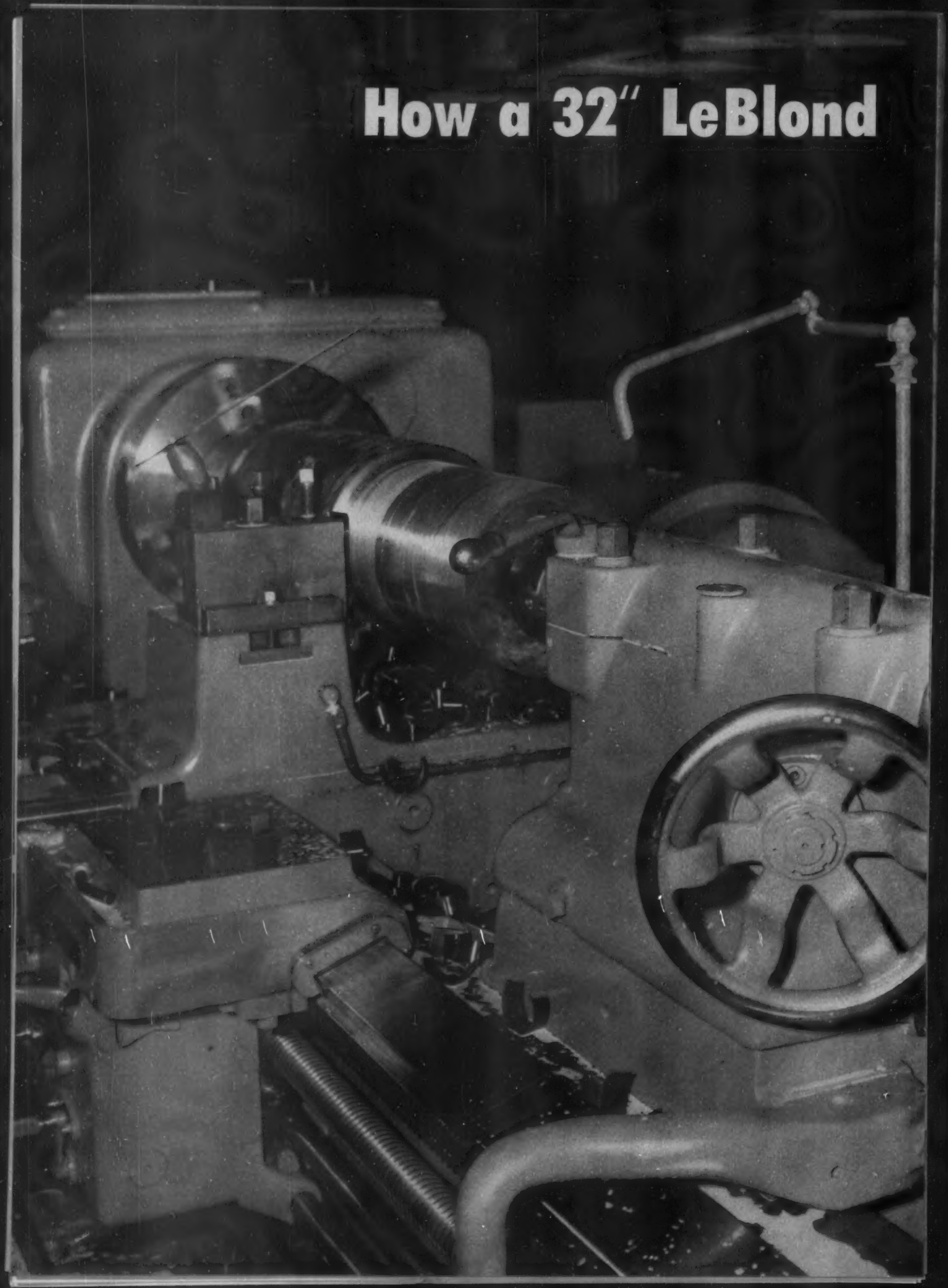
Performance like this is ***typical*** of the extra speed, output and economy you can expect with the new P&J 4-U Automatic. Designed and built specifically to handle today's tough alloys with greater efficiency, this rugged workhorse has the added power, spindle speed and rigidity needed to take ***full advantage of modern carbide tooling*** for faster metal removal.

Investigate this important opportunity for greater efficiency and increased profits. Send now for your free copy of the 4-U Circular and the "34 Ideas Booklet" to help you increase output and reduce costs.

POTTER & JOHNSTON CO.
PAWTUCKET, RHODE ISLAND
SUBSIDIARY OF
PRATT & WHITNEY
DIVISION NILES – BEMENT – POND COMPANY

P&J

How a 32" LeBlond



takes a measured 118-HP cut

Wanted. *A 32″ lathe to stand up under 100-plus horsepower cuts. Must also provide unusually-wide range of feeds and infinitely-variable speeds.*

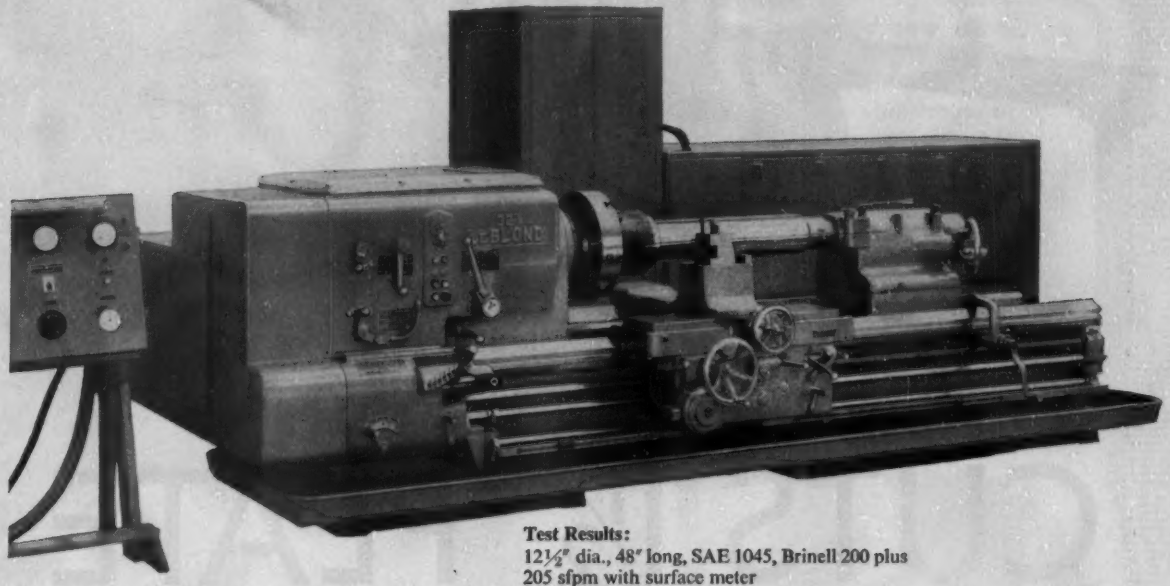
No standard model could fill these requirements. But our new 32″ Heavy Duty had the ruggedness that was needed. We made some changes, mainly in the headstock, and produced a 32″ lathe with these specifications:

Drive; 125 hp, variable speed.

Speeds; infinite from 42 to 1400 rpm.

Feeds; 56 from .002 to .250 ipr.

Plus these features that are standard on our 25″ and 32″ lathes: 4-directional power rapid traverse built into apron; one-piece double-wall apron, hardened rack; totally-enclosed quick-change box; hardened and ground replaceable steel bed ways; thrust-lock tailstock.



Test Results:
12½″ dia., 48″ long, SAE 1045, Brinell 200 plus
205 sfpm with surface meter
63 rpm with tachometer
.083″ feed per rev.
1″ depth of cut
2 hp reading on meter before cut
120 hp reading on meter during cut
118 net hp at the cut

This lathe, with variations to suit your needs, is now available. It appears to be well-suited to very high production turning of large forged or cast-steel shafts and rolls. For quotations against your specifications, get in touch with the nearest LeBlond Distributor or write Cincinnati direct.

.... cut with confidence

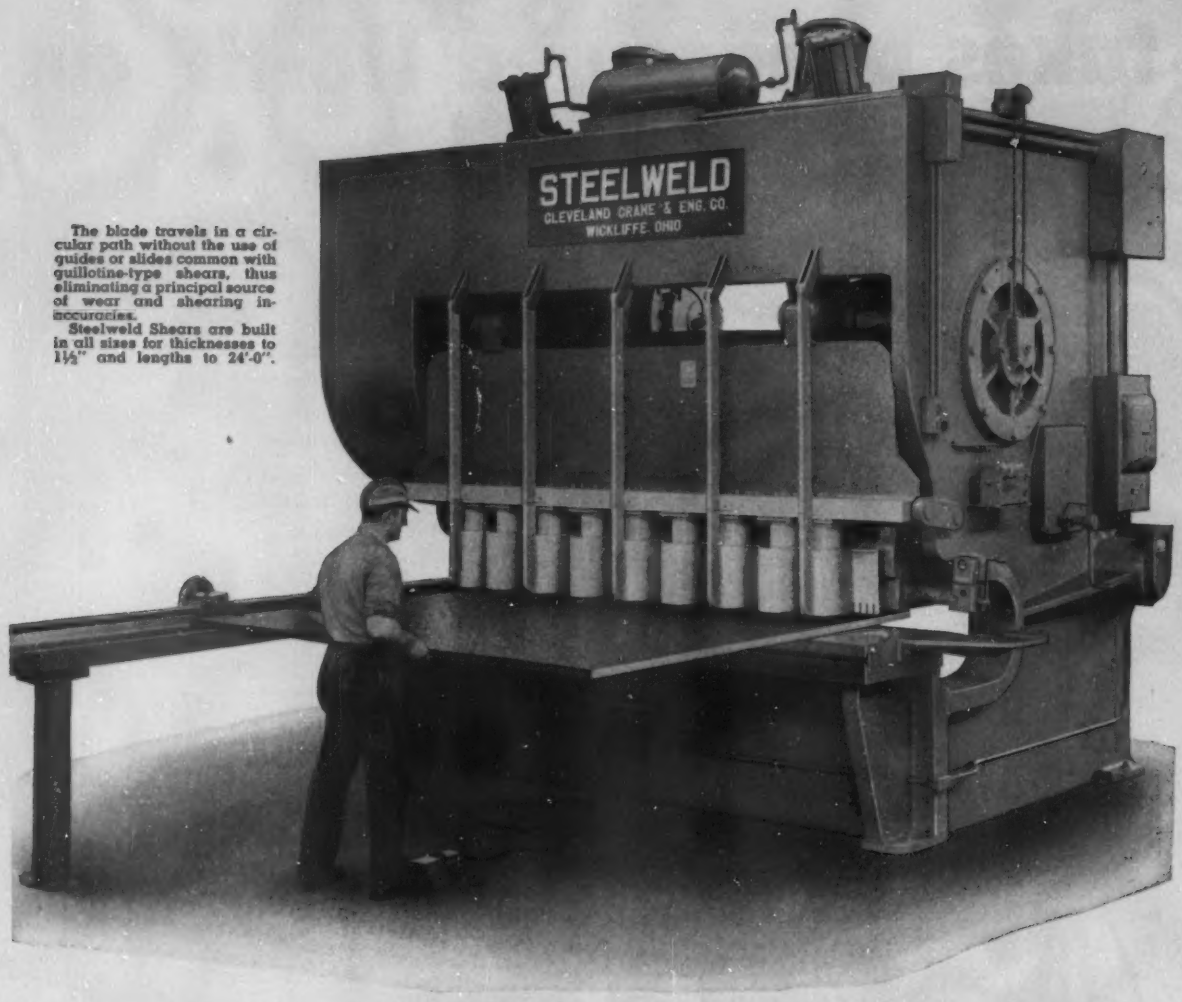
LeBLOND *of Cincinnati*

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 67 YEARS.*

The blade travels in a circular path without the use of guides or slides common with guillotine-type shears, thus eliminating a principal source of wear and shearing inaccuracies.

Steelweld Shears are built in all sizes for thicknesses to 1½" and lengths to 24'-0".



CUTS 1½" PLATE

22 cuts per minute can be made in plate up to 1½"x8'-0" with this powerful, heavily constructed shear.

Operation is noticeably quiet because blade counterbalances cushion the blow.

All thicknesses are easily cut with accurate, smooth, burr-free edges because of Steelweld's popular fast micro-set knife adjustment.

Steelweld's low-inertia clutch-brake unit provides quick, positive clutching and braking with very little slippage. Thus heat and wear are minimum.

Carefully size up this machine or any shear in the Steelweld line, and we believe you will agree that Steelwelds are the most outstanding available today.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

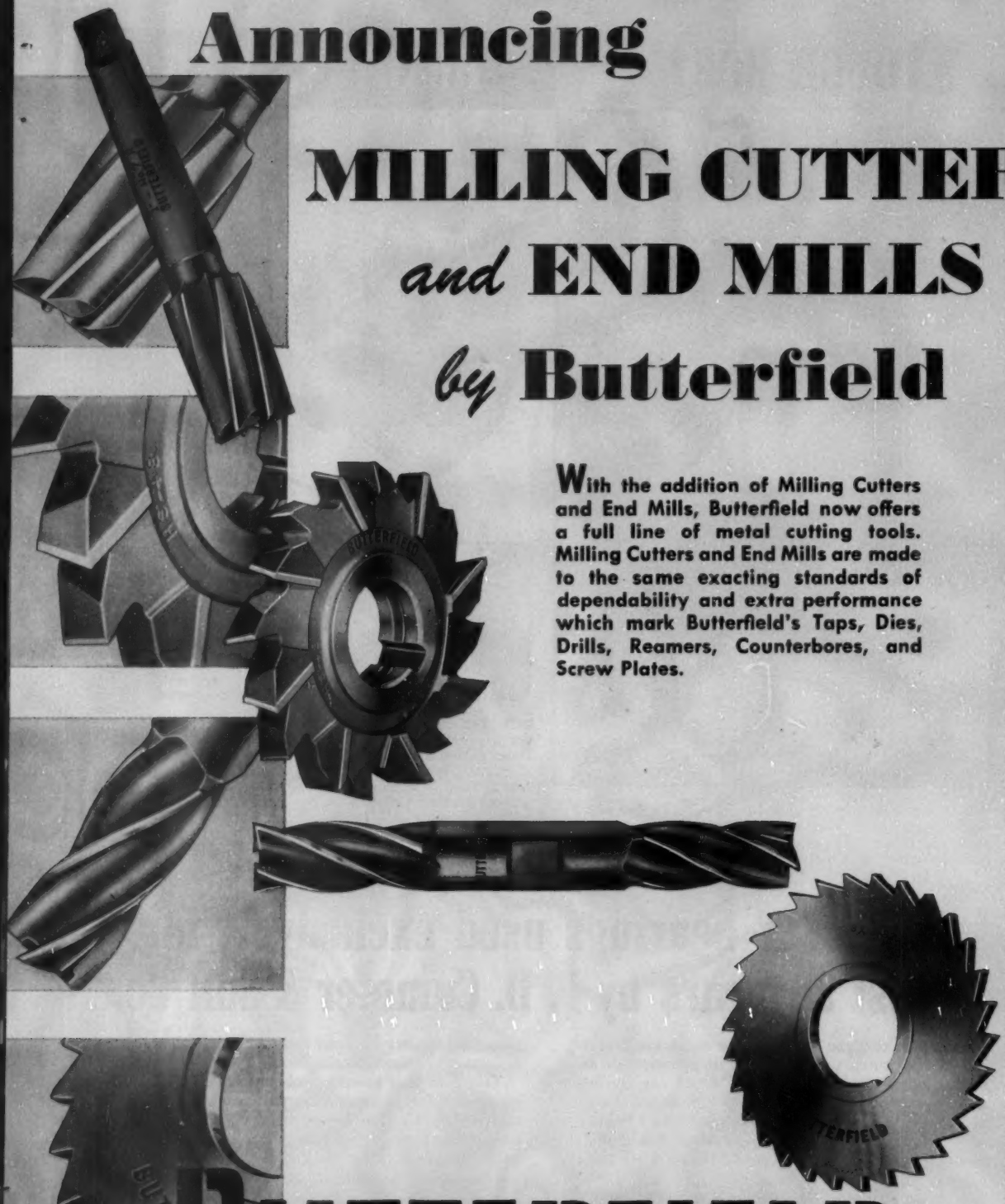
THE CLEVELAND CRANE & ENGINEERING CO.

1443 EAST 282nd STREET, WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS

Announcing

MILLING CUTTERS *and* END MILLS *by* Butterfield



With the addition of Milling Cutters and End Mills, Butterfield now offers a full line of metal cutting tools. Milling Cutters and End Mills are made to the same exacting standards of dependability and extra performance which mark Butterfield's Taps, Dies, Drills, Reamers, Counterbores, and Screw Plates.

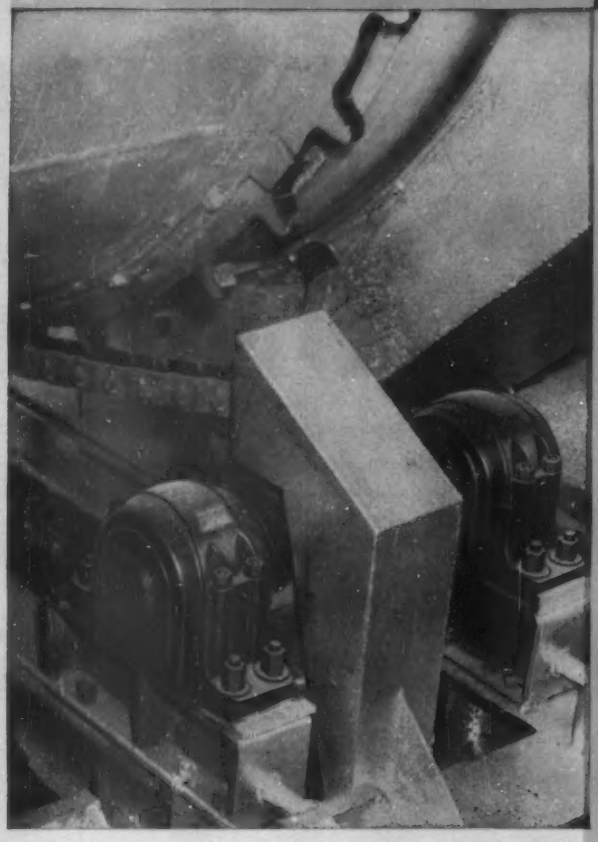
BUTTERFIELD

UNION TWIST DRILL COMPANY
BUTTERFIELD DIVISION
DERBY LINE, VERMONT, U.S.A.

TAPS · DIES · DRILLS · REAMERS · COUNTERBORES · SCREW PLATES · MILLING CUTTERS · END MILLS

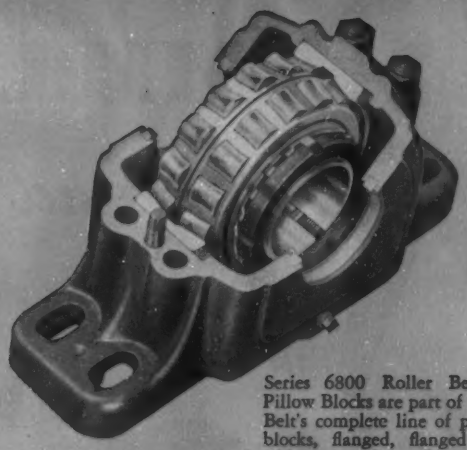
FOR BETTER SERVICE
CALL YOUR
BUTTERFIELD
DISTRIBUTOR

TOUGH JOB?

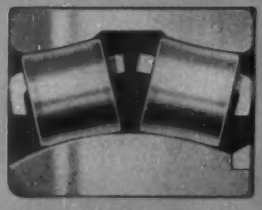


Two Link-Belt Series 6800 roller bearings provide free rolling for huge asphalt drum drives. For chain drives, elevator chain, buckets and other related equipment, F. D. Cummer has long relied on Link-Belt as their sole supply source.

READY ANSWER:



Series 6800 Roller Bearing Pillow Blocks are part of Link-Belt's complete line of pillow blocks, flanged, flanged cartridge, cartridge, take-up and hanger blocks and unmounted bearings.



INTEGRAL SELF-ALIGNMENT Concave rollers operate between convex raceways. Inner ring is true spherical element, free to align in any direction without altering contact with rollers. Symmetrical rollers completely pocketed in retainers for accurate spacing and guiding.

GREATER STRENGTH, LESS WEIGHT AND BULK. Block base is cored to provide uniform metal thickness, assuring a sound casting, free from distortion.

LINK-BELT bearings used exclusively for almost 20 years by F. D. Cummer & Son Co.

BEARINGS that can withstand the shock loads, high temperatures and abrasive grit common in an asphalt plant are indeed proof of sound engineering and top quality. So efficiently have Link-Belt bearings performed in this type of service that F. D. Cummer & Son Co., Cleveland, manufacturers of fine asphalt plants, has used them exclusively for all their shaft support requirements for nearly 20 years.

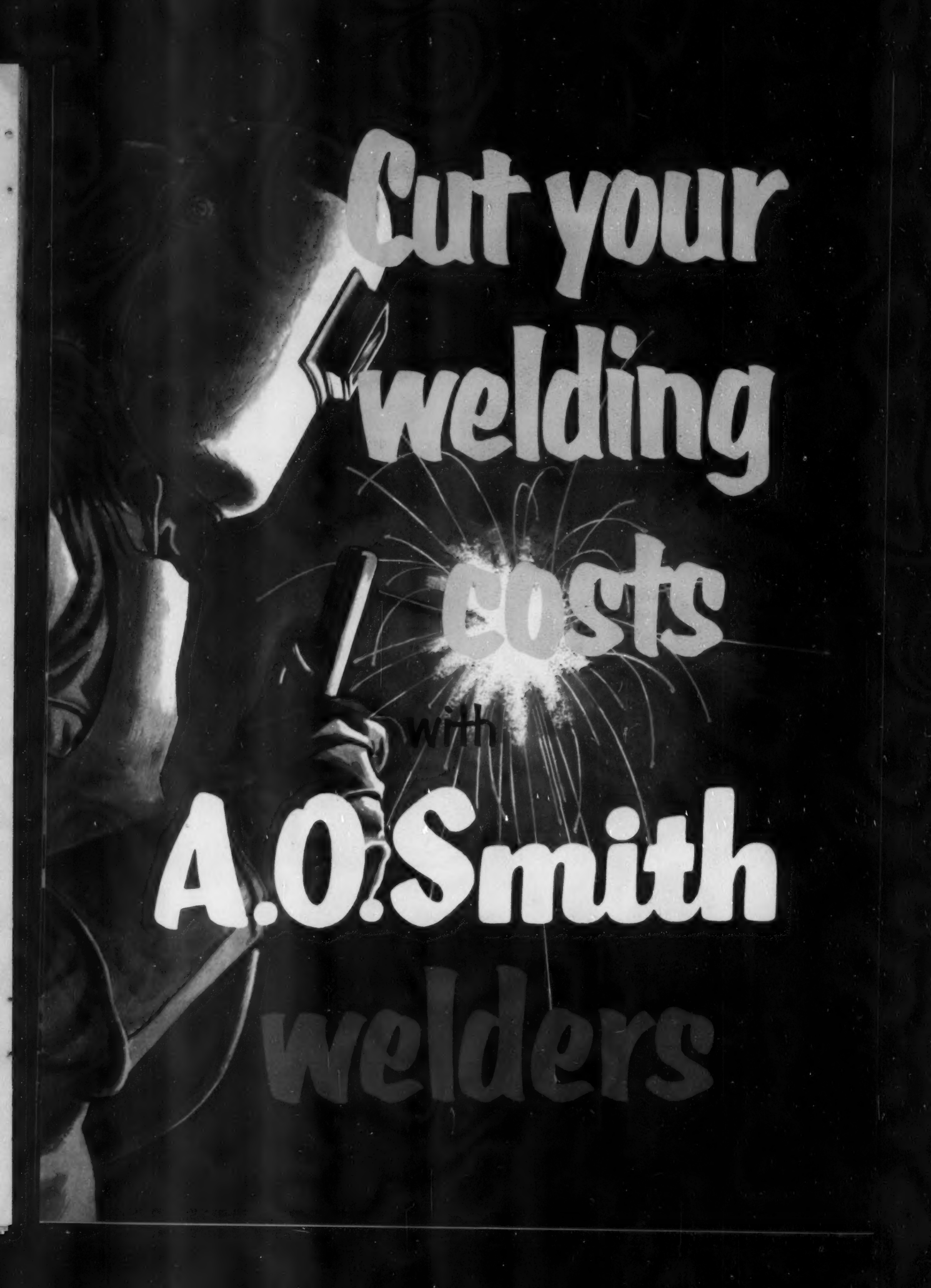
Heavy-duty Series 6800 roller bearings exemplify the design advancements that make precision-built Link-Belt ball and roller bearings first choice for America's hardest working equipment. From their ample reservoirs which prolong lubrication intervals to the compact, self-contained design—every detail contributes to long life and dependable performance. They are completely housing-sealed. Inherent self-alignment assures full load capacity even under shaft deflection or misalignment.

Talk over your bearing problems with a Link-Belt engineer. There is a size and type of Link-Belt bearing that is right for your requirements . . . and they can be supplied from factory branch stores and authorized stock carrying distributors. You can also get complete information by writing for 120-page Data Book 2550.

LINK-BELT

BALL AND ROLLER BEARINGS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.


Cut your
welding
costs
with
A.O.Smith
welders

...and get all the

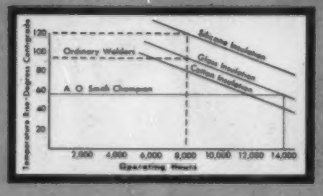
A. C. CHAMPION

heavy-duty welder

Designed and long proved the most dependable power source for continuous operation on the most demanding welding assignments at full rated output.

The CHAMPION has enough copper, plus downdraft ventilation, to assure no more than a 55° C. temperature rise when operating at full rated output. This means almost twice the operating life of any comparable heavy-duty welder!

75 open circuit volts for high-speed welding with a faster and smoother arc! You can "drag the arc" on rapid work and weld low-hydrogen electrodes without "pop-outs." All-weather case makes it as useful outside as in the shop. Available in 300-, 400- and 500-amp models.



The A. C. UTILITY for farms, garages, machine shops with dual welding range: 25-90 amps., 35-180 amps

extra benefits

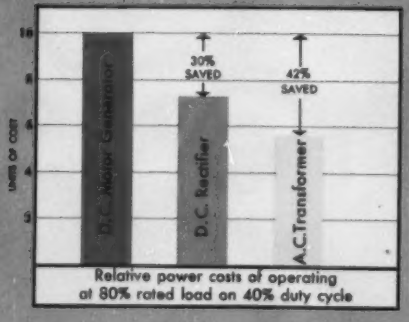
which A. O. Smith design and engineering provide!

D. C.
RECTIFIER
heavy-duty welder

Here is a complete line of N.E.M.A.-rated welding power sources that operate without a single, heavy, rotating part! No motor (other than ventilating fan) and no generator . . . nothing to wear, no commutators to corrode or turn down, no bearings or brushes to replace! Yet they provide a better welding current for all types of work, and operate with unmatched efficiency!

SAVE POWER

Power costs of operating 400-amp. welders are charted below, providing an opportunity to compare motor-generator, rectifier, and AC transformer demands on 40% duty cycle.



Relative power costs of operating at 80% rated load on 40% duty cycle

The savings in power effected by transformer type machines over motor generators result from the improved efficiency under load of the A. C. transformer (85% to 88%) and the D. C. Rectifier (69% to 72%) over the D. C. Motor Generator (45% to 50%), plus the ability of transformer and rectifier to deliver full welding current instantly, when demanded, without requiring large idle-time power to keep rotating parts in motion. The savings are real. In fact, many manufacturers have found that a new transformer will practically pay for itself in a year! Ask your A. O. Smith distributor or representative to show you how, at your next opportunity.

SAVE OTHER COSTS

You save more than power costs when M.G. sets are replaced by A. O. Smith welding machines. Rectifier and transformer welding current inherently has less arc blow, and that means higher quality welds, faster welding speeds and less spatter. It also means greater overall operator efficiency, which assures better weldments, less weld repair and gives the operator greater pride in his work. The result: more money saved and production improved!

Because there are no moving parts, A. O. Smith welders require practically no maintenance. Quiet in operation, they are built to stand up under gruelling production schedules.

Modern successor to the cumbersome, troublesome, lumbering motor-generator set! This welding power source provides smoother arc performance, more dependable amperage at all times, instant striking arcs, and uses power only when welding! It's the only rectifier-type welder designed with high-velocity down-draft ventilation, which draws cool air in over the rectifier stacks before blasting it through the machine. Even when short-circuited at full rated amperage setting, the rectifier stacks remain below critical temperature! Stepless amperage control, effortless and accurate over the full range, assures exactly the desired setting for any job. The three-phase transformer coils are precision wound, of heavy copper, for long service life. Available in 200-, 300- and 400-amp. models.

The A. C. CHALLENGER all-purpose welder 200-, 300- and 400-amp. models

The A. C. AUTO-MAN for automatic or manual use 650-amp. model, up to 4-unit multiples available

There are A. O. Smith welding power sources for every welding need, built to the highest standards in the industry and of advanced design that makes them more desirable than any other make. Job proved in the shops of the world's largest user of welding as a production tool!

It will pay you to replace M.G. sets with A. O. Smith welders. May we suggest that you write us or contact your local A. O. Smith distributor for full particulars.

A.O.Smith
CORPORATION

WELDING PRODUCTS DIVISION, Milwaukee 1, Wisconsin

INTERNATIONAL DIVISION: MILWAUKEE 1, WISCONSIN

Highest Quality Welding Electrodes

Mild Steel	AWS Class	E6010	E6011	E6012	E6012	E6013	E6013	E6020
	A. O. Smith	SW10	SW14	SW11	SW17	SW13	SW16	SW35

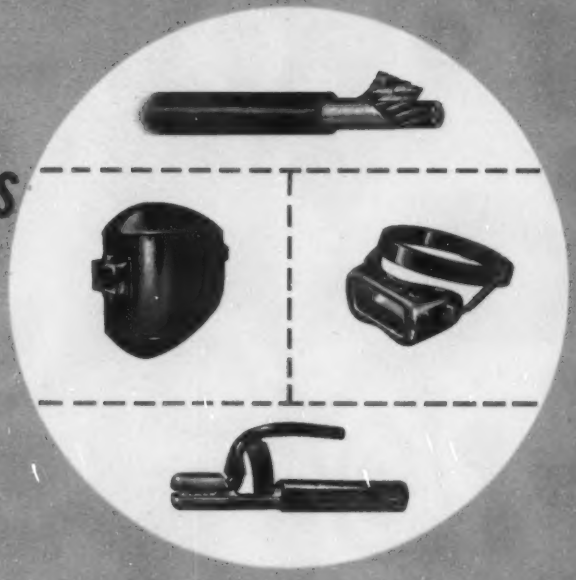
High Tensile	AWS Class	E7010	E7010	E7020	E8013	E9010	E9013	E10013	E10020
	A. O. Smith	SW75	SW80	SW76	SW86	SW95	SW87	SW88	SW101

Low Hydrogen	AWS Class	E6016	E6016	E7016	E8016	E9016	E9016	E10016	E12015	E12016
	A. O. Smith	SW64	SW65	SW84	SW81	SW90	SW89	SW100	SW120	SW103

Stainless	AISI Class	502	505	410	430	308	308	309	309	310	310	310	310	310	316	317	318	347	347
	A. O. Smith	SW151	SW152	SW153	SW154	SW162	SW362	SW166	SW167	SW159	SW359	SW169	SW168	SW368	SW160	SW161	SW158	SW157	SW357

Complete line of welding accessories

All the essentials to put welding to work are available through A. O. Smith. Quality welding cable, connectors, splicers, ground clamps, tongs, and holders; helmets, shields, gloves, and protective clothing; electrode storage ovens, machines and electrodes ... everything required for welding can be had from one responsible source. Take advantage of this for all your welding needs.

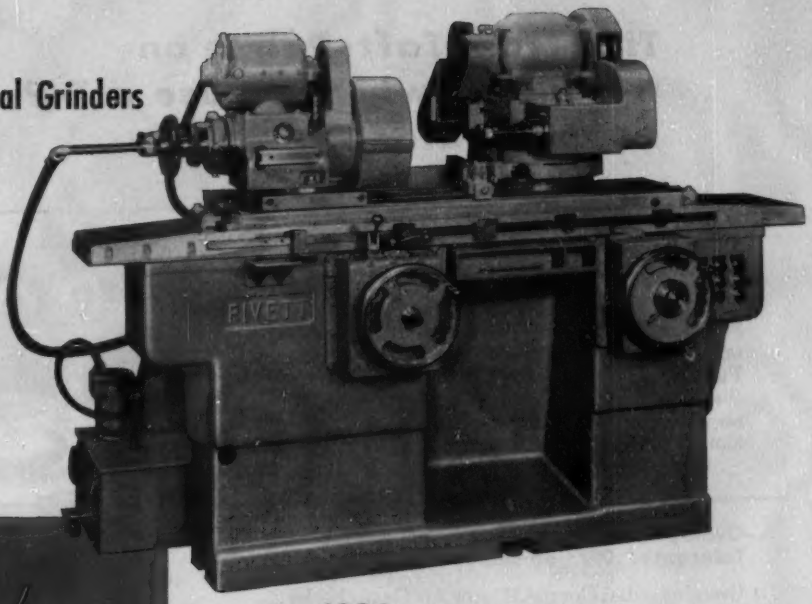


A.O.Smith
CORPORATION
WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin
INTERNATIONAL DIVISION: MILWAUKEE 1, WISCONSIN

Made by welders . . . for welders

Set-up time reduced!

Rivett Internal and Universal Grinders Lick Largest Cost Item in Toolroom and Small Lot Production!



Rivett 1024 Internal and Universal Grinder

Double-end wheelhead swivels 180°— permits rapid changes to external or internal work. Grinds holes ⅛″ to 9″ dia. and plug gauge to 6″ depth—or to 14″ by retracting wheelhead slide. External grinding to 12″ dia. up to 21″ length. 12″ standard swing over table may be increased to 14″ or 20″ for greater range. Straight, taper, two-angle, face and shoulder surfaces can be ground. Work may be held in collet, step chuck or jaw chuck, on face plate or between centers.

Rivett 84 Internal-External Grinder

A small hole grinder with *flexibility*—mounts interchangeable wheelheads for quick conversion to external grinding. Hole capacity is 3″ dia. with a max. depth of 4″; external to 3″ dia. by 4″ length. Collets and step chucks mount directly in lathe-type spindle, with lever closer for quick operation. Fine hand table traverse with dial stop for shoulder grinding. Mechanical table traverse with infinite adjustment.

Get greater versatility and accuracy! All details are shown in Catalogs 1024B and 84A! Write for copies today!

RIVETT LATHE & GRINDER, INC., BRIGHTON 35, BOSTON, MASS.

Rivett Lathe & Grinder, Inc.
Dept. AM 112, Brighton 35, Boston, Mass.
Please send: ☐ Catalog 1024B ☐ Catalog 84A.
Name_____
Company_____
City_____ State_____

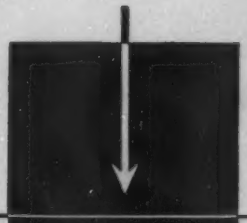
A Symbol of Accuracy in Machine Tools

RIVETT

NUMBER ONE IN A SERIES

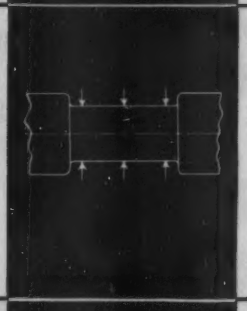
What's The Best Way To Gage These Parts?

Tips from Taft-Peirce on when and where to use a T-P CompAIRator Air Gage



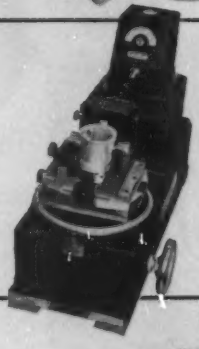
Three OD's
Tolerance: .0009″

One three dial T-P CompAIRator and Air Snap Gage checks three points simultaneously on the journals of an automotive crankshaft: Functions of the diameter (taper, barrel shape, etc.) may be seen at a glance. Simple, accurate, fast — savings in inspection time alone paid for this unit in short order.



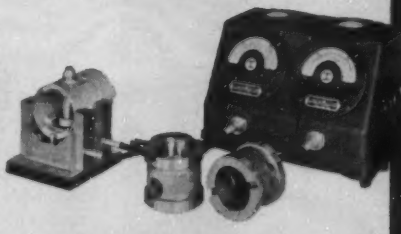
Ovality
Tolerance: .007″ on radius

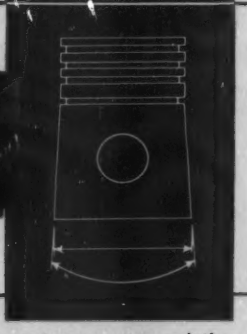
One single dial CompAIRator Air Gage checks the contour of the skirt section on this piston. Indexing table is graduated in 5° increments, permits checking entire contour at one setup. Extremely sensitive yet sturdy, vibration, jarring, tilting won't disturb the accuracy of a T-P CompAIRator.



Taper and Diameter
Tolerance: .002″

A two dial T-P CompAIRator slashes former inspection costs. One indicator checks diameter. The other, a new T-P Computing CompAIRator, measures and *figures* the taper. Indicates it directly on the dial face. Eliminates usual 2 measurements and a computation. Computing CompAIRators may also be used to check center distance, concentricity of diameters, and squareness of bore to face.





For more examples and the complete story on Taft-Peirce CompAIRator Air Gages send for Bulletin.

WHAT IS A COMPAIRATOR AIR GAGE?

A CompAIRator is a sensitive gaging instrument that measures variations in the velocity of tiny jets of air. When work is placed over these jets, air flow is restricted and its velocity reduced. Any change in air velocity reflects a change in part size, which is immediately shown on a calibrated indicator. Since only air contacts the part in most cases, there is minimum wear on gaging members. Fast, accurate, dependable, a T-P CompAIRator is simple to operate, requires little or no maintenance.

STANDARD AND SPECIAL COMPAIRATORS | COMPUTING COMPAIRATORS | AUTOMATIC SORTING MACHINE | AIR ELECTRIC COMPAIRATORS

T-P means Top Precision

T P

THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, RHODE ISLAND

Multiple spindle automatic builders do not deny the importance of good frame design. As early as 1920 Cone's revolutionary frame was substantial evidence that Cone did something about it.

For some time there has been discussion concerning the relative merits of the use of 100% carbide tooling on multiple spindle bar automatics. There has been very little information made available about successful carbide application to this type of machine by its builders or by carbide suppliers. But Cone is doing something about it.

The Conomatic Carbide Development program is accumulating much helpful information for "automatic" users through test runs under production conditions. The illustration is an example of such information applied to an actual production run. Full data is available.

Action speaks better

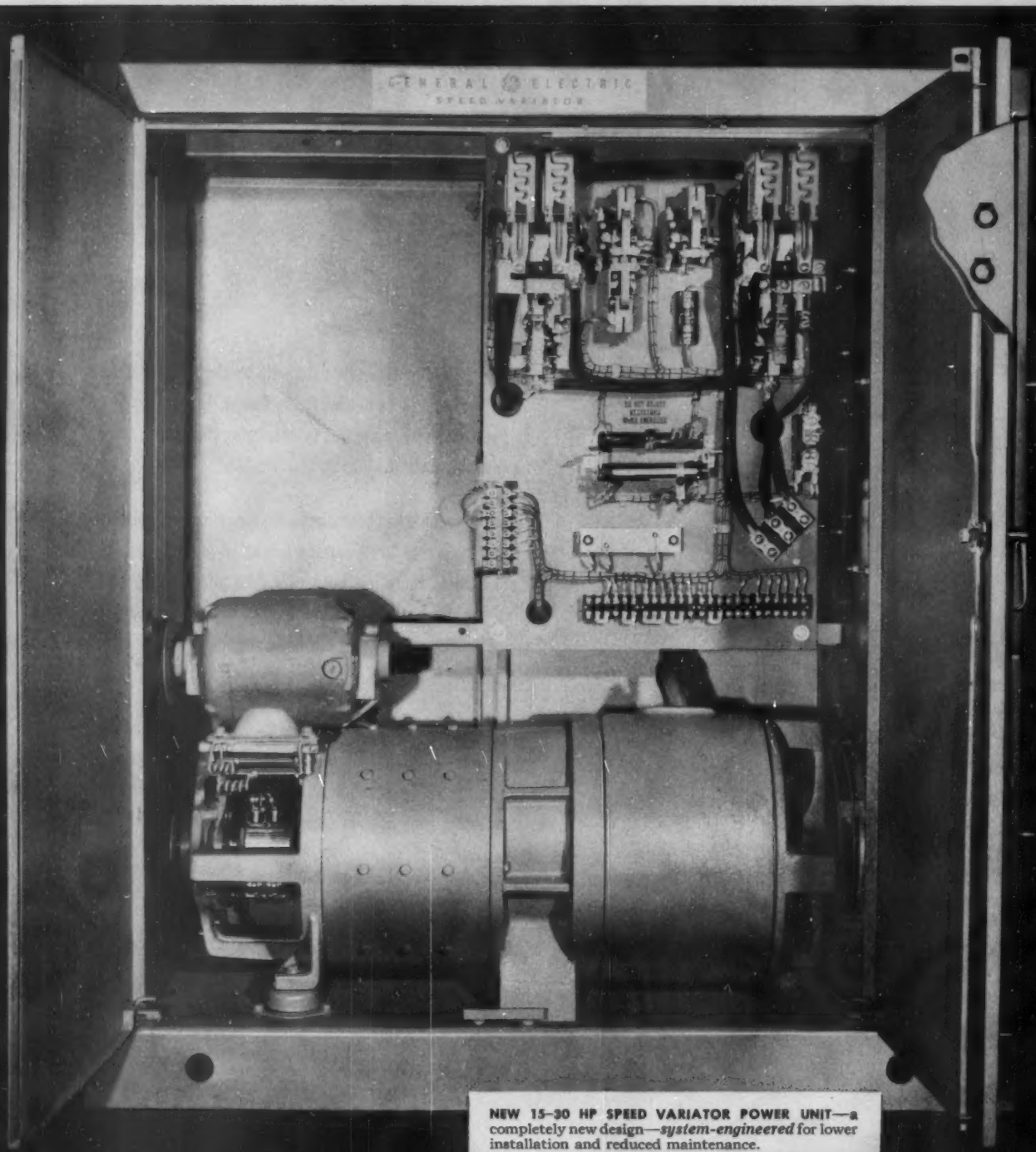
MATERIAL—ALUMINUM: Hole drilled with 1" and 1 1/16" dia. drills to 1½" depth, and tapped to ¾" depth.

	HSS	CARBIDE
Cycle Time	90 secs.	11 secs.
Work Spindle Speed	270 R.P.M. at 104 S.F.	830 R.P.M. at 320 S.F.
Tool Wear	5,000 pcs. per grind	20,000 pcs. per grind

Conomatic}

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

General Electric Announces



NEW 15–30 HP SPEED VARIATOR POWER UNIT—a completely new design—*system-engineered* for lower installation and reduced maintenance.

GENERAL ELECTRIC

NEW 15-30 hp Speed Variator

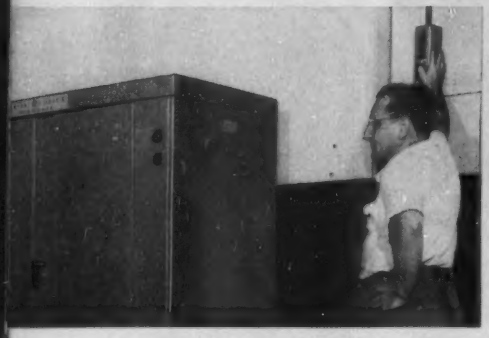
Gives you lower installation and maintenance costs— PLUS better adjustable-speed performance.

COMPLETELY REDESIGNED, this 15–30 hp power unit is the latest addition to the General Electric Speed Variator line—a packaged, adjustable speed drive—*system engineered* to improve and simplify your machine operation.

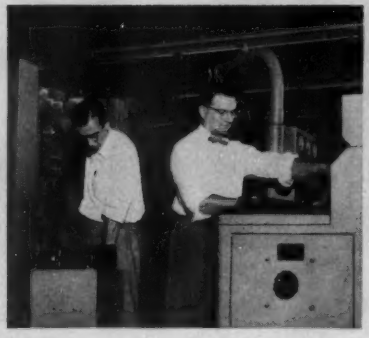
NEW FEATURES, designed and engineered to give you lower installation and maintenance costs and more accurate, versatile adjustable-speed performance, are illustrated below.

FOR MORE INFORMATION, write Section 822-2 for bulletin GEA-6180 on the 15–30 hp unit, bulletin GEA-6127 on the complete 1 to 200 hp line, or contact your nearest G-E Apparatus Sales Office. General Electric Co., Schenectady 5, N. Y. 822-2

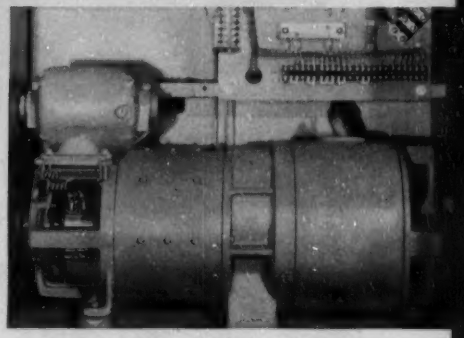
LOWER INSTALLATION COSTS



NO SPECIAL FOUNDATION NEEDED for power unit—no bolting down—just a reasonably level space. Fewer conduits to run between components—power unit and operator's control station can be located wherever convenient.

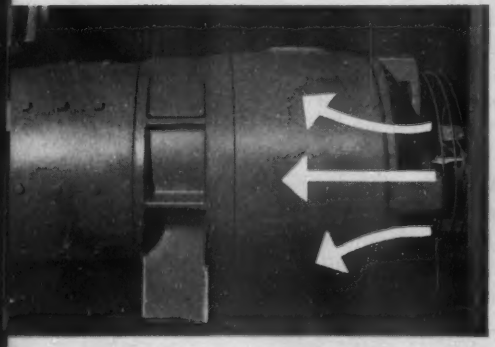


COSTLY SET-UP TIME REDUCED—Every Speed Variator is completely tested and all major adjustments made at the G-E factory. You receive a packaged drive, *system-engineered* for you, ready to install and operate.

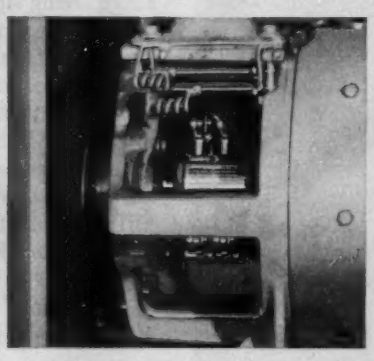


NO M-G SET ALIGNMENT PROBLEMS—All motor generators are factory installed, wired and tested. Set is mounted in cabinet on self-supporting base—three-point suspension on rubber dampers reduces vibration and noise.

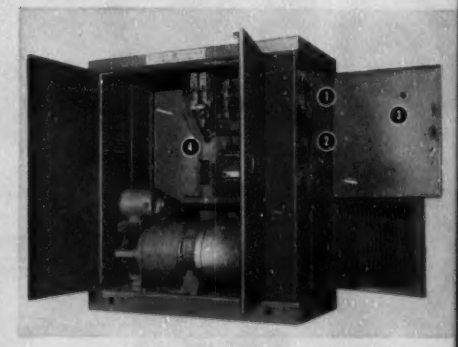
BETTER PROTECTED—LESS MAINTENANCE



POSITIVE PRESSURIZED CABINET assures cleaner operating atmosphere for power unit—large fan pulls air through glass fiber filter, raising inside pressure. Air filters are inexpensive, easily replaced. Removable doors, front and back.



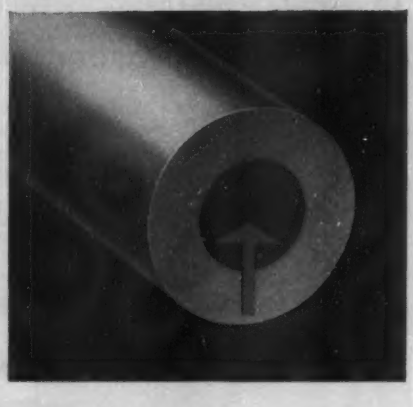
SIMPLIFIED MAINTENANCE—Large handholes and cutback cabinet provide easy access to brushes, commutator and grease fittings. Standard control throughout with color-coded wiring for easy identification and quick maintenance.



BETTER PROTECTED EQUIPMENT—(1) A-c control is in separate compartment. (2) Short-circuit protection inside case. (3) Lockable disconnect switch must be OFF to open a-c door. (4) D-c devices equipped with d-c control for longer life.

GENERAL ELECTRIC

a hole here is annoying . . .



a hole here is helpful

Crucible Hollow Tool Steel Bars are helping eliminate the wasteful practice of drilling out a solid bar to make ring-shaped, or tubular steel parts, or tools with a center hole. The hole is already in Crucible hollow tool steel bars . . . no need for drilling, boring, cutting-off or rough-facing operations.

You can get these hollow bars in any of Crucible's famous tool steel grades, in almost any combination of O.D. and I.D. sizes. And you can get *immediate* delivery of five popular grades—KETOS® oil-hardening, SANDERSON® water-hardening, AIRDI 150® high carbon-high chromium, AIRKOOL® air-hardening, and NU DIE V® work tool steels—from a conveniently located Crucible branch warehouse.

Call your Crucible representative for the full story of how these steels can best save you time and money. You'll be glad you did.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

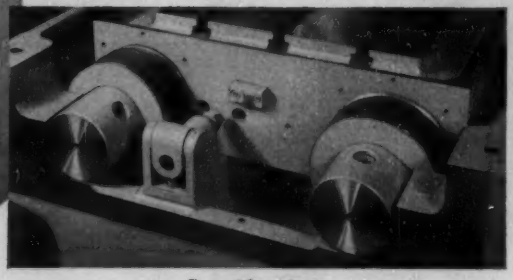
HOLLOW TOOL STEEL

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

THE BRYANT 6" STROKE *all Mechanical* BORING MACHINE

provides...

uniform accurate production



Specifications

Total table stroke	6"
Top of table to top of bridge	4"
Width of bridge	27⅜"
Multiple boring heads as required by tooling to a maximum of (4) 209 heads	
Table dimensions	17½" x 22"
Floor space (without coolant tank)	31" x 54"

The Bryant 998 Boring Machine is a production machine for precision boring, drilling, turning, facing, grooving and contour turning and boring where fine finish and rapid production are desired.

Constant repetitive accuracy is designed into the Bryant 998. The table is mechanically actuated by a simple cam and lever unit. The cycle is positive . . . free from variation due to temperature change.

The table moves on two 4" dia. hardened and ground solid steel bars firmly bolted to the bed. Each slide bar has two widely separated bearings — hardened steel sleeves surrounding retainers in which 150 balls of ⅜" diameter are mounted under preload.

This rugged slide construction provides metal-to-metal contact, resists loads from any direction, provides sensitive response and uniform travel.

The Bryant 998 will withstand heavy use and will continue to produce parts within tolerance at the specified production rate.

Mail coupon for complete details!

BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VT.

Gentlemen: Please send me your Bulletin 998. AM

Name.....

Title.....

Company.....

Street.....

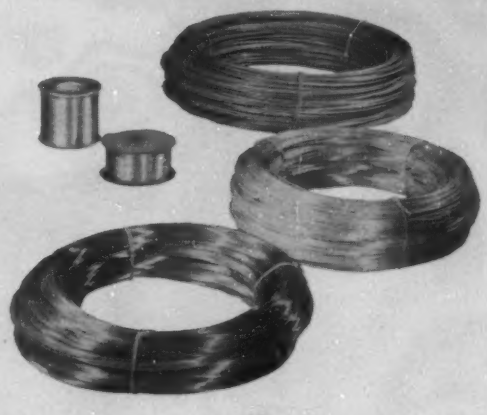
City.....Zone....State.....

BRYANT Chucking Grinder Co.

SPRINGFIELD, VERMONT, U. S. A.

Internal Grinders • Boring Machines
Internal & External Thread Gages • Granite Surface Plates

KAISER ALUMINUM PRODUCTS

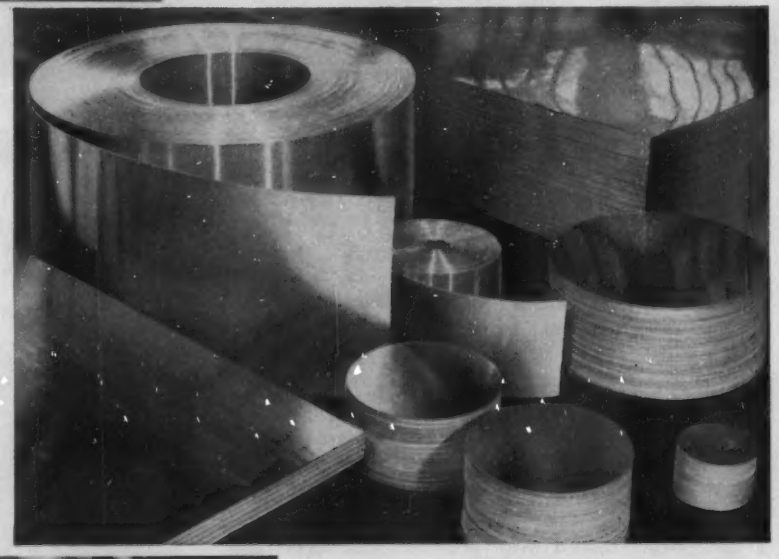


Wire

Supplied as round drawn, hexagonal, rivet, welding, screen, EC, redraw.

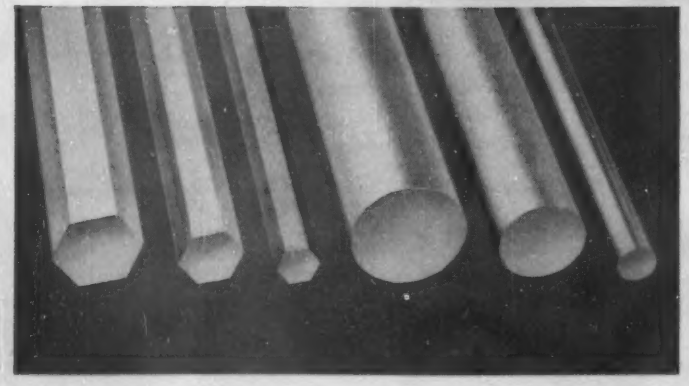
Extruded Shapes

All standard alloys are available in custom shapes (solid, semi-hollow and hollow), structural, rod and bar, and in extruded tube.



Sheet and Plate

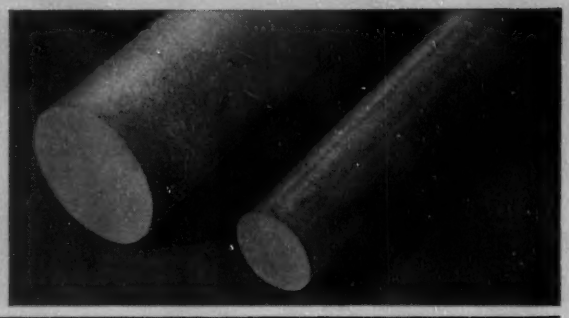
Supplied as flat sheet, plate, coil sheet, circles in a complete range of alloys, sizes and tempers. Specialty sheets available on inquiry.

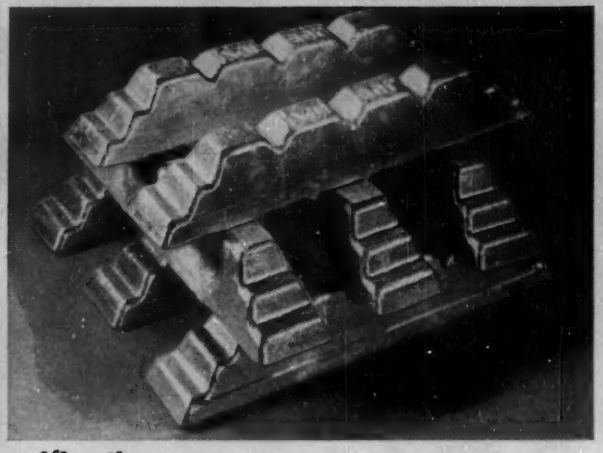


Rod and Bar

Available in a wide range of alloys in rolled and cold finished rod, round and hexagonal standard screw machine stock, hexagonal bar, redraw rod, rivet rod and round forging stock, square and rectangular bar.

for you...the nation's fabricators





Pig, Ingot and Billets to meet your specifications

Kaiser Aluminum produces Pig, Ingot and Extrusion Billets in a range of alloys and sizes to meet your specific requirements. In addition, Kaiser Aluminum provides the services of its engineers to work closely with you to select proper alloys or to help improve production methods.

MORE THAN 85 per cent of Kaiser Aluminum's total production is sold in the form of these mill products for fabrication by customers. It's the highest percentage in the industry.

We believe we are ideally equipped to work with you, because serving manufacturers with basic aluminum is our primary business.

In recent years, our services have been expanded in order to keep pace with our greatly increased production capacity—which today stands at close to 30% of all the primary aluminum made in this country.

We have vastly expanded our national warehousing system, our distributor program, and our staff of metallurgists and field engineers.

We believe that the kind of service we offer—combined with the unsurpassed quality of Kaiser Aluminum—should be of particular interest to all aluminum fabricators in these days of stiffer competition.

For complete information, call or write any Kaiser Aluminum sales office or one of our many distributors, located in principal cities. See our catalog in Sweet's Product Design File or write for copy. Kaiser Aluminum & Chemical Sales, Inc., General Sales Office, Palmolive Bldg., Chicago 11, Illinois. Executive Office, Kaiser Bldg., Oakland 12, California.

Other Kaiser Aluminum products include: industrial foil, and electrical conductor. Kaiser Aluminum also supplies household, freezer and broiler foil for home uses; Shade Screening for the building industry and roofing and siding sheet for farm and industrial buildings.

Kaiser Aluminum

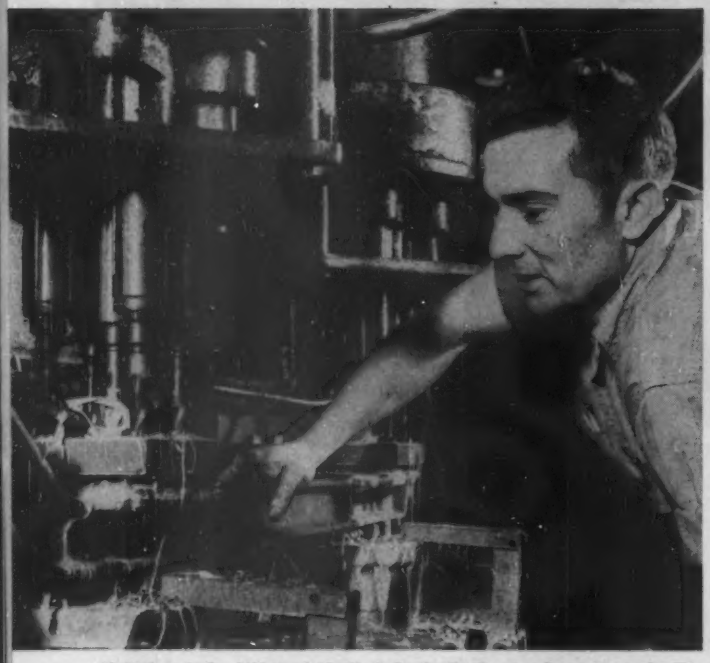
setting the pace—in growth, quality and service

MAIL COUPON FOR FREE HANDBOOK

Send for the new Sheet and Plate Handbook. 152 pages. A "must" for every fabricator of aluminum.

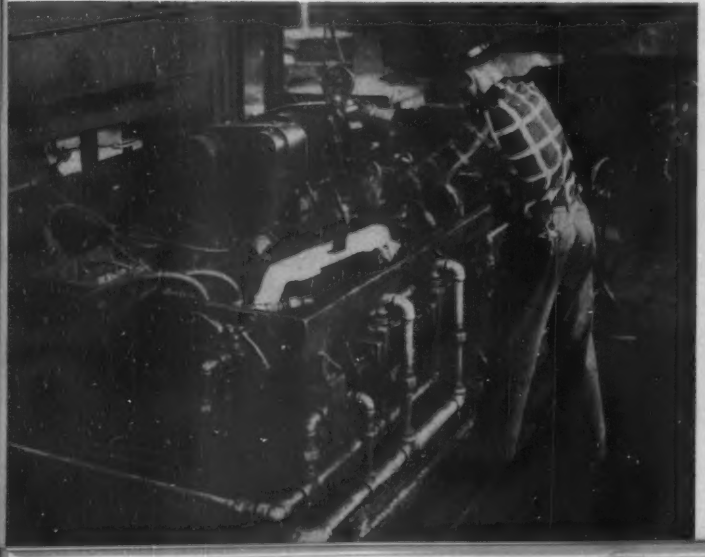
KAISER ALUMINUM & CHEMICAL SALES, INC.
INDUSTRIAL SERVICE DIVISION
51144 KAISER BLDG., OAKLAND 12, CALIFORNIA
Please send my free copy of "Sheet and Plate Handbook."
Name_____
Firm_____
Address_____
City_____ State_____

For trucks that must "roll until



Multiple spindle drilling of 10 clip holes in the front axle spring pads. The particular CARILLOY Steel used for these parts has good strength and toughness, but is easy to drill and helps keep down tool costs.

Forged axles are heated, quenched and tempered to obtain desired hardness and strength. CARILLOY Steel is easy to heat treat to the desired hardness.



Final assembly of finished axles prior to painting and shipping. They will be used in heavy duty trucks that encounter severe off-road service. The necessary durability can be obtained only with a high quality alloy steel.

USS Carilloy Steel gives heavy-duty front axles needed strength, toughness and impact resistance

● Fire trucks, garbage trucks, and municipal hauling equipment take a hard beating and must stay a long time on the job with minimum maintenance. Farm trucks and heavy-duty trucks used in mining and construction grind through mud, ruts, and open fields daily. Every part of this equipment has to be rugged . . . has to keep working continuously until the trucks are ready for the scrap heap. Rockwell Spring and Axle Company makes front axles for trucks like these; and to build in the needed durability, they use USS CARILLOY Steel extensively, not only for axles, but for steering knuckles and arms, steering knuckle pins, and steering arm ball studs. They use it everywhere that extra stamina is needed.

If your equipment must face up to severe service, if you want durability and resistance to abuse beyond the ordinary, specify USS CARILLOY Steels. You can get practically any combination of strength, toughness, and impact resistance . . . in a wide range of sizes, forms, and heat treatments . . . to *any* quality specification.

When you have any question about steel or its use, call in a USS Service Metallurgist for expert assistance.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy USS Steels

ELECTRIC FURNACE OR OPEN HEARTH — COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

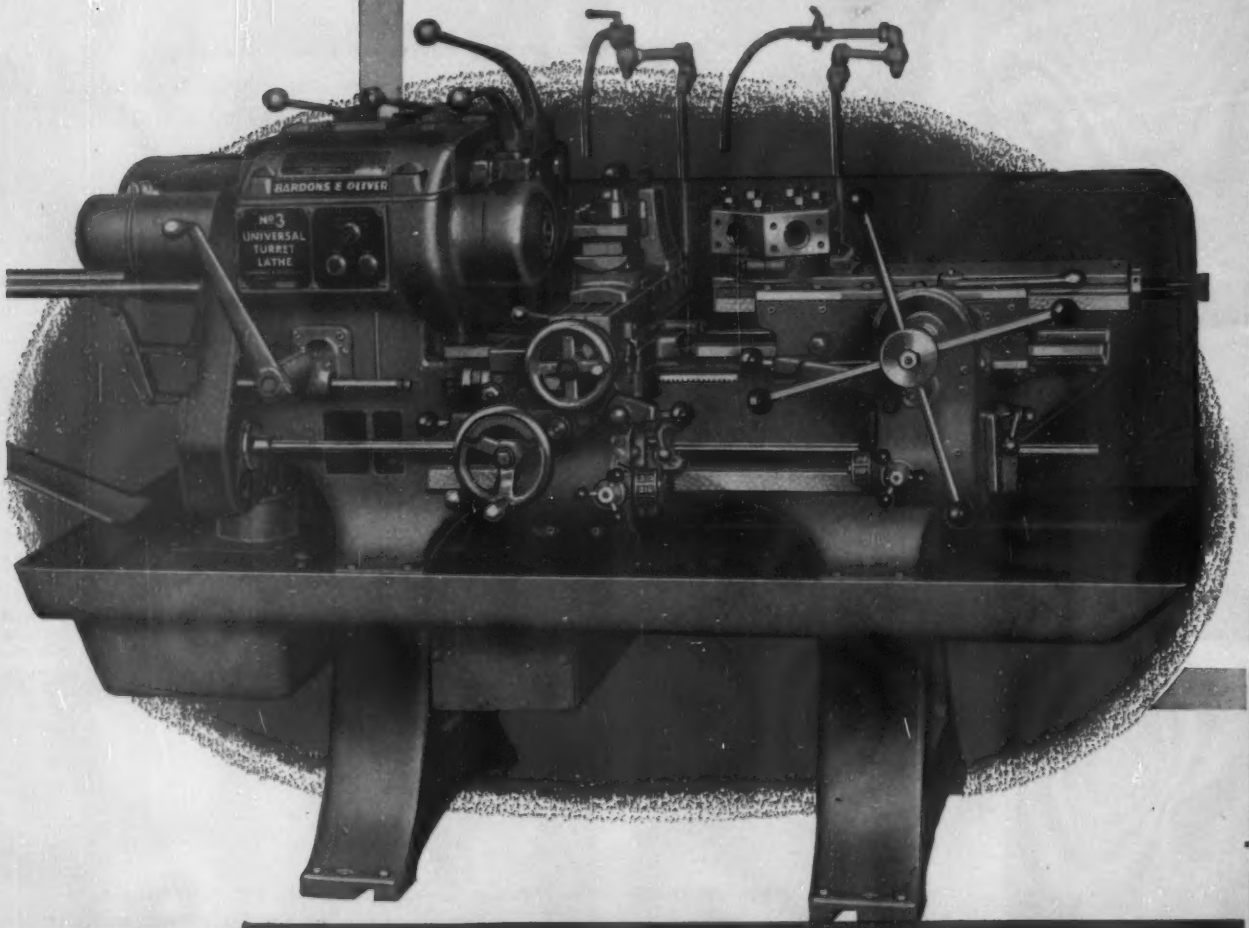
UNITED STATES STEEL

New... BARDONS & OLIVER No. 3 TURRET LATHE...

★ 25% higher speed

★ 50% more power

★ 100% increased rigidity



BARDONS & OLIVER, INC.

1134 WEST 9TH STREET • CLEVELAND 13, OHIO

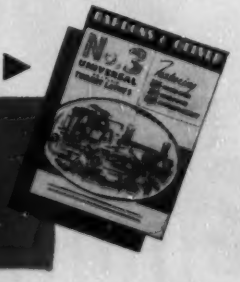
Featuring!

- √ 1825 R. P. M. Spindle Speed
- √ Unequaled Rigidity of "X" Type Cross Ribbing over Full Length of Bed
- √ 100% Anti-Friction Bearing Headstock
- √ Single Lever Feed Selectors for both the Hex Turret and Universal Carriage
- √ Alloy Bronze Anti-Backlash Nut on Cross Slide Screw
- √ "One-Shot" Lubrication of all Tool Slide Ways
- √ Flange Type Motor Mounting that Eliminates all Belts and Pulleys
- √ Hardened and Ground Steel Turret Slide and Saddle Ways, Gibs and Caps
- √ 7½ H. P. available at each one of 12 Geared Spindle Speeds
- √ Instantaneous High-Low Speed Change through Double Multi-Disc Clutch
- √ Replaceable Bed Ways of Solid Hardened and Ground Alloy Steel
- √ Large Hardened and Ground-in Thread Ball Bearing Cross Slide Screw
- √ Sealed Carriage and Saddle Aprons
- √ Improved Square Turret, Designed and Built for Lifetime Accuracy
- √ Impeller Type Coolant Pump with Individual Motor Drive
- √ Optional Collet Chuck Capacities (1½" or 2")

Specifications!

Swing Over Bed	15½ inches
Swing Over Guides	13¾ inches
Swing Over Cross Slide	7⅝ inches
Collet Chuck Capacity	1½ or 2 inch round
Hexagon Turret Travel	10 inches
Cross Slide Travel	9 inches
Carriage Longitudinal Travel	18½ inches
Turret and Carriage Power Feeds with Single Lever	6
Number of Speeds with Single Speed Motor	12
Motor Horse Power	7½
Net Weight With Cabinet Motor	3050 pounds
Net Weight With Flange Motor	2850 pounds

SEND FOR NEW NO. 3 CATALOG ▶



MANUFACTURERS OF A COMPLETE LINE OF
TURRET LATHES AND CUTTING OFF LATHES

Newest Press Room Time-Saver!

If you are interested in obtaining the advantages of automation in your press room, the newest U. S. Automatic Coil Cradle can help make your press room operations faster and more efficient.

This cradle has a capacity for material up to 9 inches wide, in coils with an O.D. up to 40 inches. It is equipped with two coil rest rolls mounted on self-aligning roller bearings. A pair of hardened and ground power-driven take-out rolls unwind the material to the very end of the coil. The ¼ HP geared motor provides output up to 52 feet per minute, and is started and stopped through a mercury switch loop control. Motors can be furnished to provide even higher output if required.

For further time savings, the unit has been designed so that it is a simple matter to place a coil in position without having to raise it to a considerable height, or remove and replace retaining arms, as would be necessary if a stock reel were used.

If you have press room production problems, send for a copy of Bulletin 80-A. From the complete line of U. S. Automatic Press Room Equipment it describes you can find profitable, practical solutions to many of your production problems.

U. S. AUTOMATIC
PRESS ROOM
EQUIPMENT

U.S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides—U. S. Multi-Millers
U. S. Automatic Press Room Equipment — U. S. Die Sets and Accessories

Whatever kind of gears you make...
Whatever way you make them

National Tool Co.

can supply the right type cutting tool
because we make *all* types

National Tool Co., with 50 years experience in the manufacture of special cutting tools, makes *all* varieties of gear cutting tools for *all* types of spur, helical and worm gears—as well as for sprockets and splines. Whatever your gear requirements—large or small—National engineers can help you decide the most efficient method of producing them. Many gear manufacturers have found it profitable to look to National Tool Co. for all their gear cutting tool requirements.

Gear Shaving Cutters

Hobs

Rack Type Gear Shaper Cutters

Gear Shaper Cutters

Involute Gear Cutters

Master Gears

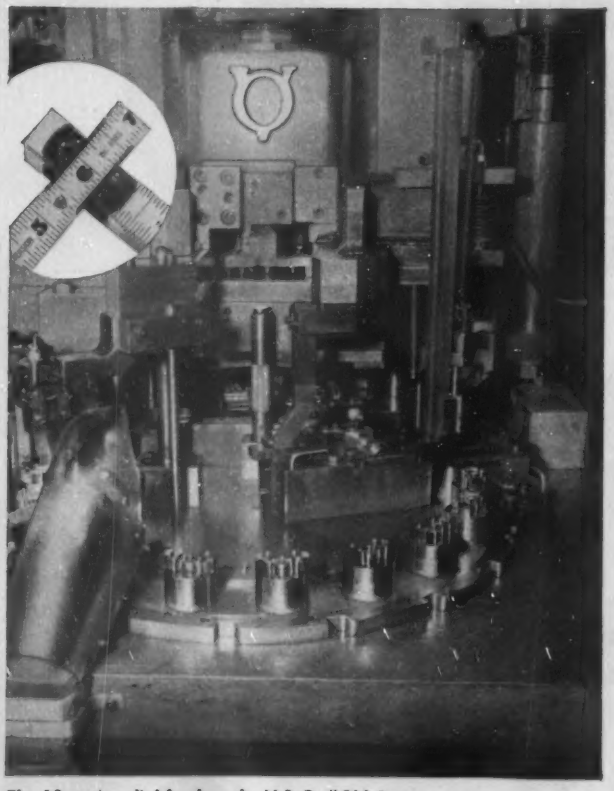
Herringbone Gear Cutters

National
TOOL CO.
Cleveland 2, Ohio

Representatives in major industrial centers

In continuous cycles the V & O #50S Press with dial feed turns out 20,000 complete clamp assemblies for folding wood rules in the regular working day. From right to left—the spring is stripped from a magazine, the female and male clamp halves are formed, an eyelet inserted and expanded, and the complete assembly delivered to a hopper.

AUTOMATED V&O PRESS BOOSTS MAN-HOUR PRODUCTION 2000%



The 18 station dial feed on the V & O #50S Press at the Master Rule Mfg. Co. has supplanted 13 smaller presses and more than tripled total daily production. So accurate is the alignment of the press that the dies are removed for sharpening only after each five-millionth piece. Production per man-hour is up over 2000 per cent.

Fourteen men and fourteen machines, working an overtime schedule, previously produced 6,000 clamps for wood folding rules a day at Master Rule Mfg. Co., Middletown, N. Y. Now, one of the original presses, a V & O No. 0, makes the stainless steel springs. A V & O No. 50S with dial feed and two progressive dies has taken the place of the other thirteen machines for producing the clamp halves and completing assembly. Present production, with two machines and two operators, is in excess of 20,000 clamps for a 7½ hour day.

V & O has been designing and building precision power presses since 1889. Because they are built like precision machine tools you can safely use the clever and expensive tooling required for automation. With automated V & O presses you can depend on higher precision production and you can count on lowered unit costs.

Our representatives will be glad to show you how V & O automation can make your operations more productive and more profitable.

THE V&O PRESS COMPANY

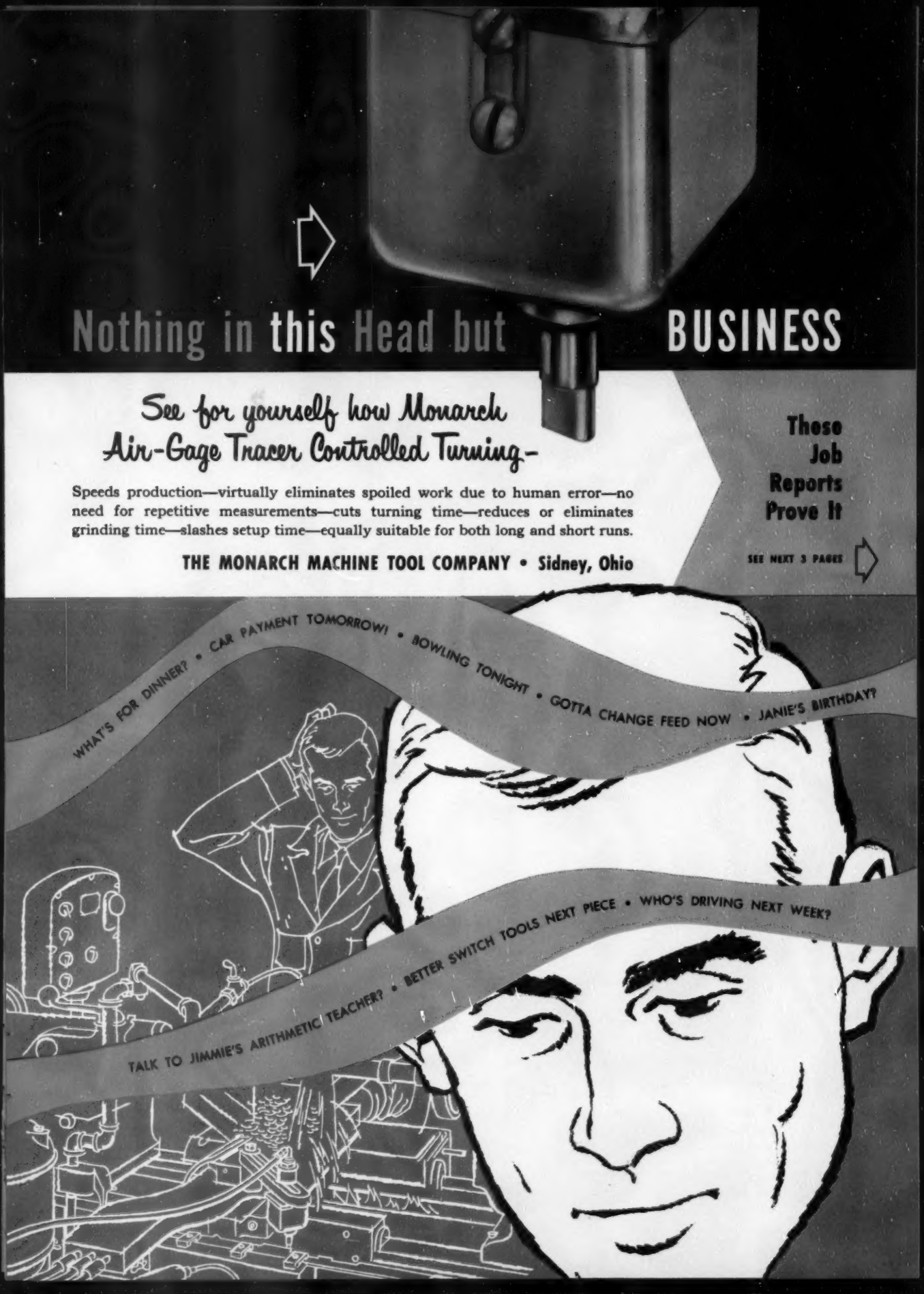
DIVISION OF EMHART MFG. CO.

HUDSON, NEW YORK

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

65th Anniversary

Only the best is good enough

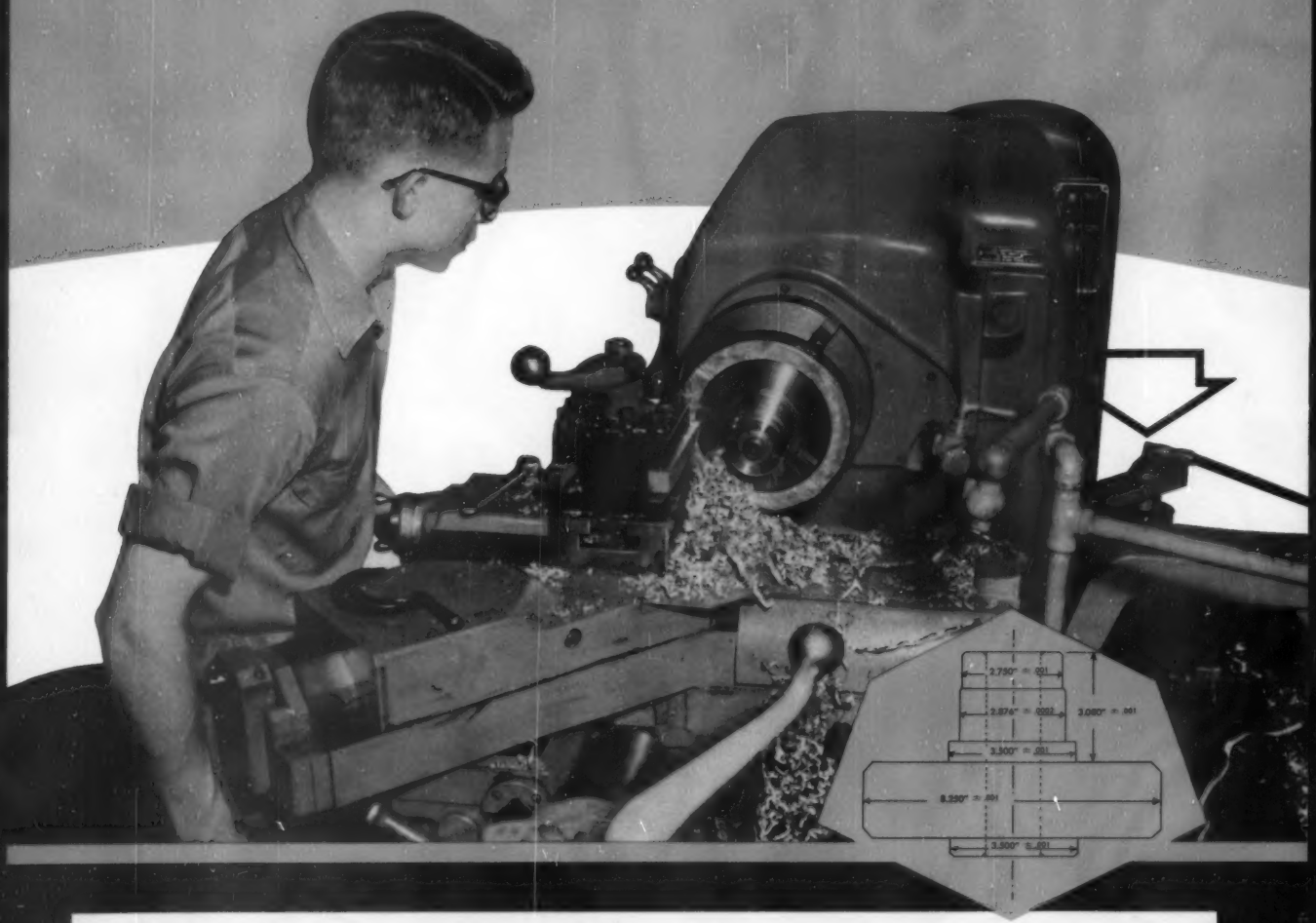

Nothing in this Head but BUSINESS
See for yourself how Monarch Air-Gage Tracer Controlled Turning—
Speeds production—virtually eliminates spoiled work due to human error—no need for repetitive measurements—cuts turning time—reduces or eliminates grinding time—slashes setup time—equally suitable for both long and short runs.
THE MONARCH MACHINE TOOL COMPANY • Sidney, Ohio
These Job Reports Prove It
SEE NEXT 3 PAGES
WHAT'S FOR DINNER? • CAR PAYMENT TOMORROW! • BOWLING TONIGHT • GOTTA CHANGE FEED NOW • JANIE'S BIRTHDAY?
TALK TO JIMMIE'S ARITHMETIC TEACHER? • BETTER SWITCH TOOLS NEXT PIECE • WHO'S DRIVING NEXT WEEK?

WHAT A HEAD FOR BUSINESS!

Phenomenal reductions in turning time, when the Monarch Air-Gage Tracer starts turning the work, are reported to us over and over again by pleased and happy customers. See if any examples on these pages or the next are similar to any problem of your own. If not, the coupon on the second page following will bring you full details and many more examples—or a job report of your own.

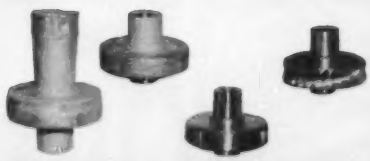
As you analyze these cost-reducing production figures, don't overlook the Air-Gage Tracer's accuracy and versatility. The movement of slide to control point repeats itself within a limit of .0001", making it the most accurate of all duplicating devices. Recommended for turning multiple diameter shafts, and turning, boring and facing contours, its versatility accommodates it to a great variety of work.

Why can't the Air-Gage Tracer give *your* production a boost? Can't you use help like this? Study the jobs—send in the coupon—and let Monarch take it from there... *The Monarch Machine Tool Co., Sidney, Ohio.*

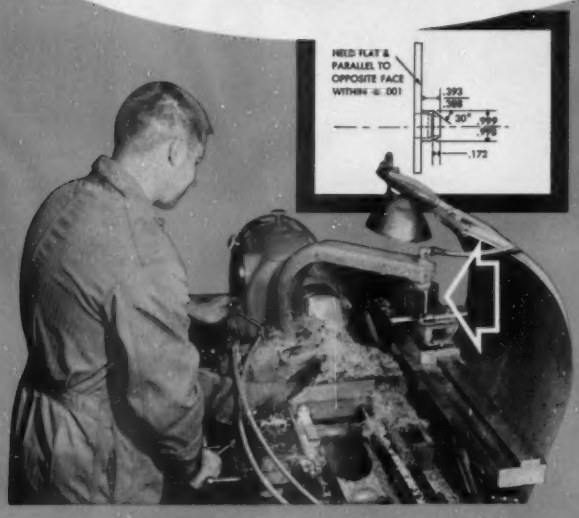


AIR-GAGE TRACER TIME, FLOOR TO FLOOR—6 Minutes.
OLD TIME—50 minutes.

Part—Bronze Worm Gear. **Machine**—20" Series 60 "Air-Gage Tracer." **Material**—high tensile manganese bronze. **Operation**—rough and finish turn complete. **Cutting tool**—carbide. **Limits**—±.0002" ball bearing fit limit is held on one diameter. **Other limits** are ±.001". Total floor to floor time is 6 minutes against 50 minutes on a turret lathe—more than 8 times the production!



Check these Air-Gage Tracer Reports

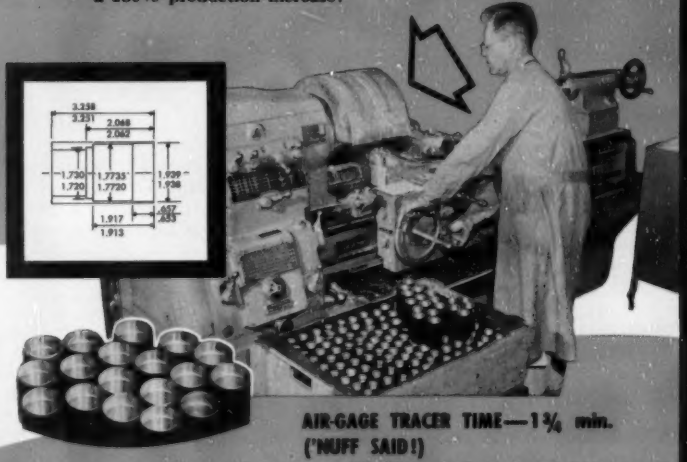


AIR-GAGE TRACER TIME—4¾ min.
OLD TIME—7 pieces per hr.

Part—Housing Cover. **Machine**—10" Model EE Air-Gage Tracer. **Material**—aluminum forging. **Operation**—turn, face and chamfer. **Limits**—portion of part which is faced held flat and parallel to opposite face within ±.001". Total floor to floor time is 4¾ minutes compared with production of 7 pieces per hour previously.

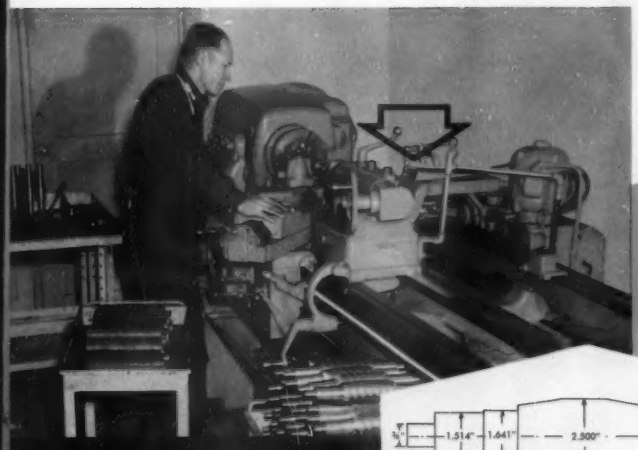
AIR-GAGE TRACER TIME—6.9 pieces per hr.
OLD TIME—1.8 pieces per hr.

Part—Motor Shaft. **Machine**—16" Series 60 "Air-Gage Tracer." **Material**—SAE 1045 bar stock, 1-13/16" diameter x 25-13/16" length. **Operation**—turn complete. **Cutting tool**—carbide. A completely finished work piece (after all machining operations) is used as a round template. Previous to installation of "Air-Gage Tracer" 1.8 pieces were produced per hour, now 6.9 pieces are produced per hour—a 280% production increase!



AIR-GAGE TRACER TIME—1¾ min.
('NUFF SAID!)

Part—Motor Shell. **Machine**—13" Series 60 "Air-Gage Tracer." **Material**—seamless steel tubing. **Operation**—bore and internal face. Total floor to floor time is 1¾ minutes. This is another good example of the proficiency of the "Air-Gage Tracer" on bore operations. There are three bores of different dimensions and the material is seamless steel yet the operator turns the parts out without fear of spoilage and in the remarkably short floor to floor time of 1¾ minutes.



AIR-GAGE TRACER TIME—10 min. per piece
OLD TIME—60 min. per piece

Part—Worm Shaft. **Machine**—20" Series 60 "Air-Gage Tracer." **Material**—4340 steel. **Operation**—rough and finish turn complete. **Cutting tool**—carbide. Total floor to floor time is 10 minutes per piece compared with 1 hour required previously. Six times the production!

THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO

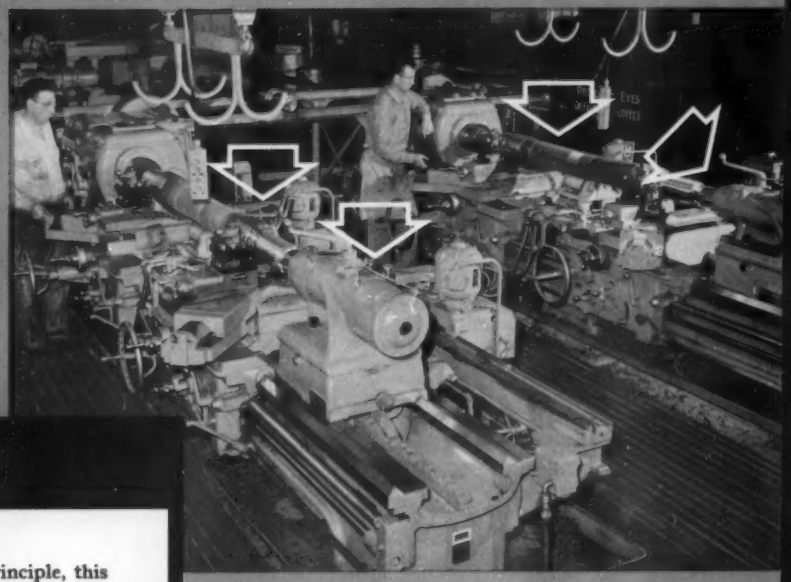
See Next Page for COUPON

TWO DOUBLE-HEADERS

double the output

AIR-GAGE TRACER TIME—7½ min.
OLD TIME—15 min.

Part—Anti-friction freight car axle. **Machine**—Monarch 25″ x 120″ Heavy Duty Lathe with dual carriages, each Air-Gage Tracer controlled. **Material**—A.I.S.I. C1040 steel forging. **Operation**—finish turn journals, journal dust guards and radii—both ends. **Limit**—±.001″. Engine and center drive axle lathes with expensive form tools, previously used, presented difficulty in maintaining center distances of radii. Air-Gage Tracer turns journal O.D. and radii with desired accuracy, allowing plunge grinding without excessive grinding wheel breakdown, as before. And production is doubled!



ASK FOR INFORMATION!

Hydraulically operated, controlled on air-gaging principle, this is the most accurate duplicating device on the market. With tracer stylus operating on a pressure of only 5-6 ozs., change in template contour converts to corresponding tool position in thousandths of a second and movement of slide to control point repeats itself within a limit of .0001″. It can be applied as factory equipment on all sizes of 10″ to 32″ machines, the Mona-Matic and Right Angle Lathes—exclusive swiveling type optional on most of them. With the Auto Cycle Unit, many Monarch Lathes with Air-Gage Tracer Controls become fully-automatic, high-production units. Air-Gage Tracer controlled lathes can be converted to or from manual control in seconds.

ENGINE LATHES—10″ to 32″
TOOLMAKER'S LATHES—10″ to 20″
THE MONA-MATIC—for high production metal turning
THE SPEEDI-MATIC—a fast, precision hand screw machine
THE MONARCH MOTOR-TRACE
THE MONARCH-KELLER TURNING MACHINE
THE MONARCH AIR-GAGE TRACER
THE MONARCH ROLL TURNING LATHES
THE MONARCH 60″ RIGHT ANGLE LATHE
THE SHAPEMASTER ENGRAVER
SPECIAL TURNING MACHINES

THE MONARCH MACHINE TOOL COMPANY
SIDNEY, OHIO

Gentlemen:

☐ I am interested in your Air-Gage Tracer story and would like to receive your illustrated Booklet, with complete data and job performance reports. Please send me your Booklet 2607 without obligation.

☐ Please have a Monarch sales engineer call on me.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

STARTLING CINCINNATI TIME SAVINGS AT WESTINGHOUSE

10′ Cincinnati Bickford Master Super Service Radial at Westinghouse Electric Corporation. Sunnyvale, California.

Photos courtesy The Westinghouse Electric Corporation.

This Cincinnati Bickford Master Radial Drill with 26″ diameter column, the largest built in America, is drilling this tough nickel alloy-steel steam turbine housing with a startling time saving. The time for drilling one 4 11/16″ diameter hole 21″ deep before installation was 2½ hours. Now, the 40 HP of this machine hogs out the metal in one hour. Write for details.

80 YEARS OF SERVICE

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

Efficiency in Cutting-off is Important

Practically all machining operations start with pieces cut-off from bars or billets. Hence, inefficiency, or lack of capacity, in the cut-off department can hold up or stagnate the entire plant.

A. Are all-ball-bearing and provide a quick return; therefore they run FASTER than others on the same work.

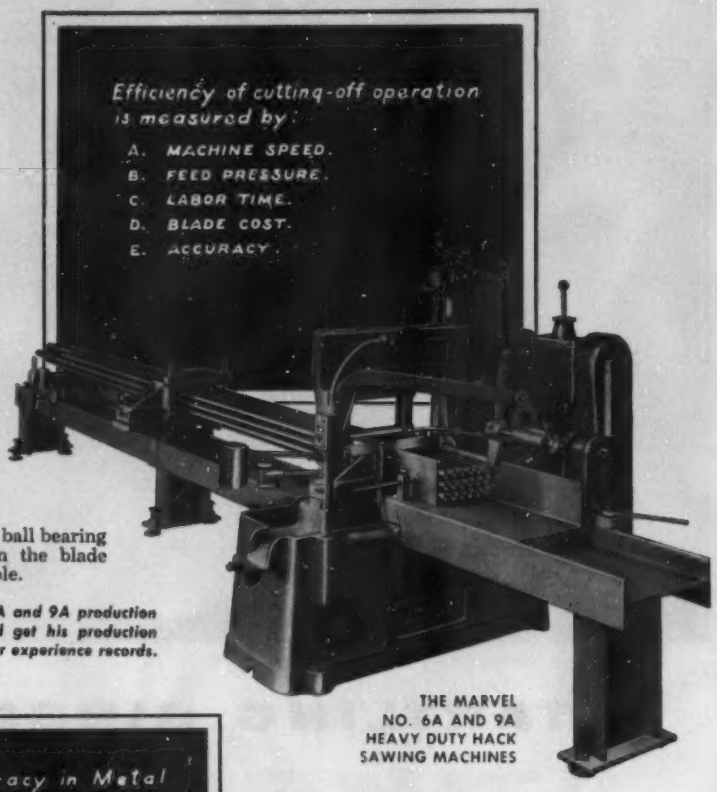
B. Can apply as much as 1200 pounds feed pressure—two to ten times as much as other hack saws and band saws.

C. Are fully automatic, requiring no more operator attention than an automatic screw machine; and set-up for any bar size and cut-off length is extremely simple.

D. Use a non-breakable high speed hack saw blade — the type of saw blade that produces the greatest number of square inches of metal cut per dollar of blade cost—two to ten times (or more) as much as any band saw.

E. Because of their exceptional sturdiness, ball bearing reciprocating frame, ability to tension the blade "truly taut", their accuracy is dependable.

If you are not using modern, improved MARVEL NO. 6A and 9A production hack saws, call the local MARVEL Field Engineer and get his production and cost estimates on your work—to compare with your experience records.



THE MARVEL NO. 6A AND 9A HEAVY DUTY HACK SAWING MACHINES

Formula for Accuracy in Metal Sawing:
ACCURACY = (Length, Straightness, Squareness)
(Straightness, Squareness) = (Blade Rigidity, Blade Tautness)
MARVEL
HIGH-SPEED EDGE
ARMSTRONG BLUM MFG. CO.
CHICAGO ZZ MADE IN U.S.A.

The composite MARVEL High-Speed-Edge Hack Saw Blade—cuts **any** machinable material efficiently. There is no time lost changing blades for different types of steel; no time lost replacing shattered blades, because MARVEL High-Speed-Edge Hack Saw Blades are positively **unbreakable.** These superior blades have the finest high speed steel cutting edge welded to a strong alloy steel body. They will stand-up under the highest speeds and heaviest feeds attainable on any make hack saw. Can be safely tensioned tauter than any other blade—cut-off not only straight but also square and with less stock loss.

Write for catalog C-55—showing and describing eleven different series of Metal-Cutting Sawing Machines and MARVEL-High-Speed-Edge Hack Saw Blades and Hole Saws.

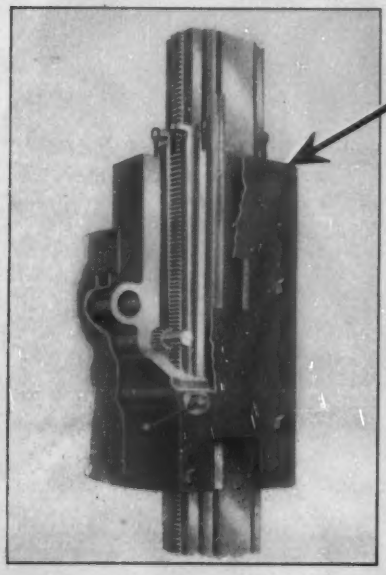
MARVEL Metal Cutting SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

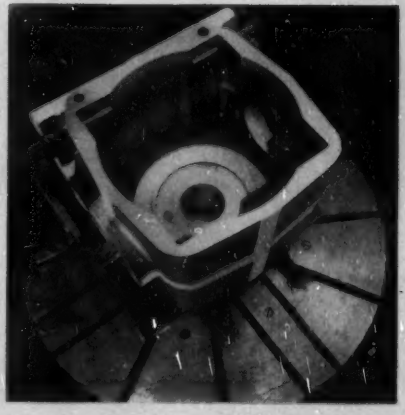
At The Oilgear Company—KING precision assures *exceptional accuracy* in taper boring

For the Oilgear Company, Milwaukee, Wisc., the 62″ King® Vertical Boring & Turning Machine, shown at right, precision-machines castings for high pressure pumps. An example of the extreme accuracy obtained is the taper boring, in Class 50 gray iron, of 7″ diameter x 8″ deep holes to .005″ per inch of taper, while holding .001″ tolerance on the diameter for the entire depth of the hole. A finish better than 125 micro-inches is maintained. On other boring, facing, and turning work—on parts for cases, end covers, rotors, etc., for 60, 100, and 150 hp. Oilgear Pumps—similar dimensional precision and fine finish are obtained.

Here again is on-the-job *proof* of how King superior design, massive proportions, and extra-rigid construction provide the ability to cut costs and improve quality on the complete range of boring, facing, and turning work. King machines are made in ten sizes, from 30″ to 144″. For full information see your King Distributor, or write us.



Cut-away drawing of rail head, at left, illustrates how extra rigidity is built into King machines, assuring an unvarying accuracy that makes possible fine-dimension tapering and other operations such as those described by the Oilgear Company . . . Drawing shows construction of support and guiding of the ram in its relation to the swivel. There are eight bearing surfaces, two on each side of the rectangular ram. Adjustment to these surfaces is obtained with the use of four gibs, two on the front and two on the side. To overcome any spreading of the guiding surfaces of the ram, a plate the full length of the swivel is tongued, as shown. Accurate guiding surfaces are thus maintained at all times.



Close-up view of the work being machined above. Note the fine finish (better than 125 micro-inches) obtained on the facing work and in the tapered bore, as a result of King built-in precision features.

KING AMERICAN STEEL FOUNDRIES • KING MACHINE TOOL DIVISION
1150 Tennessee Avenue . . . Cincinnati 29, Ohio
VERTICAL BORING & TURNING MACHINES

2 Heads are better than 1
SIMONDS
DIE STEEL
SIMONDS

...You and your SIMONDS DISTRIBUTOR

Together you make a Top Team when it comes to handling your Industrial Supply Problems Quickly...Efficiently...Economically

YOUR SIMONDS DISTRIBUTOR runs a business that's set up to fit hand-in-glove with yours . . . to perform functions and services which would be an extra burden to you. Are you taking full advantage of all these services he offers? . . .

- Your Simonds Distributor carries ample stocks that would tie up your own funds . . . enables you to keep your inventory low.
- Your Simonds Distributor is your nearest and quickest source of supply . . . 24 hours a day . . . ready to deliver what you want when you want it.
- Your Simonds Distributor simplifies your purchasing procedure . . . handles your needs for many items, all under one order, one bill, one payment . . . saves you time, trouble and expense all along the line.
- Your Simonds Distributor is an up-to-the-minute source of information on new equipment, materials, parts . . . and on new techniques of engineering, production, maintenance.
- What's most important, your Simonds Distributor "knows his book" on Simonds Products for cutting metal, wood, plastics, paper, etc. And he knows how to make sure you get the best results out of the finest line of products made today . . . the Simonds red-trademarked line that's 100% quality-controlled from steel to finish grinding.

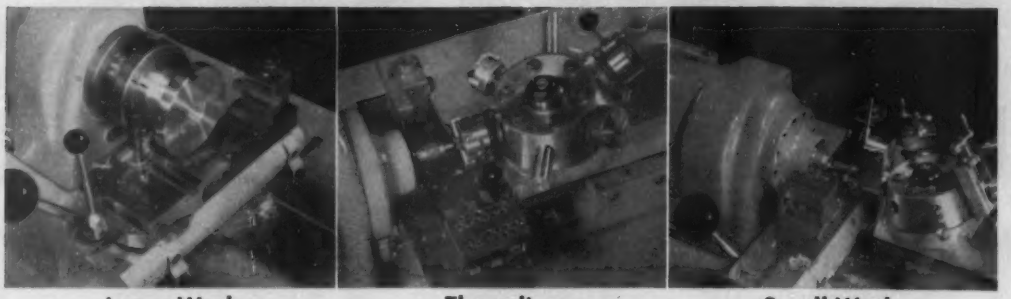
For quick deliveries large or small
Give your Simonds Distributor a call

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

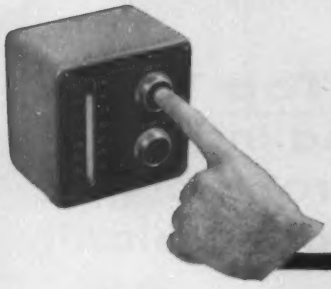
Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon • Canadian Factory in Montreal, Que.
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y. • Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

HARDINGE
ELMIRA, N.Y.

NEW Variable Speed Machine for PRODUCTION DEPARTMENTS



Large Work | Threading | Small Work



Simply Push a Button for Exact Spindle Speed

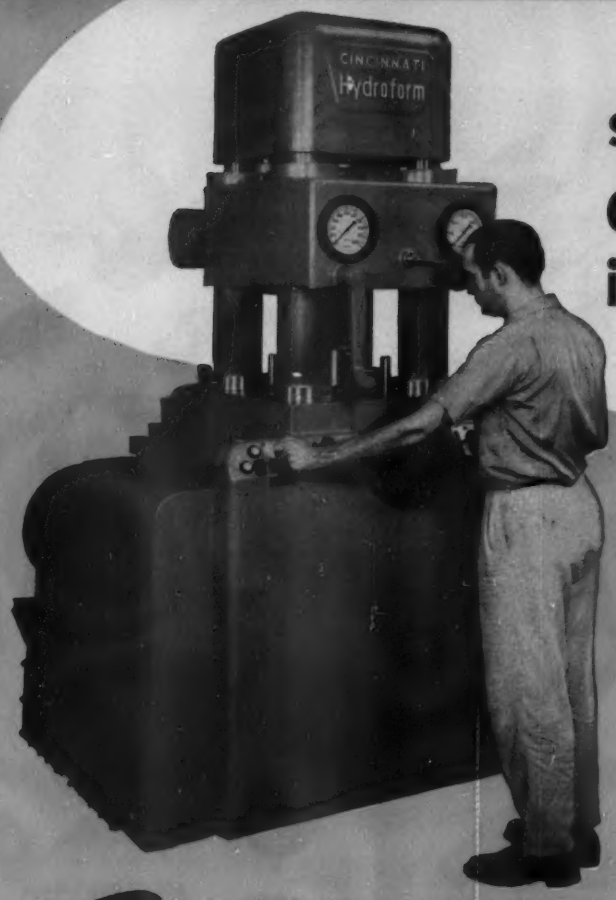
Produce More Precision Parts at Lower Cost with this NEW Second Operation Machine

Send for Free illustrated Bulletin DSM59

HARDINGE BROTHERS, INC. ELMIRA, NEW YORK, U.S.A.

OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette St., New York 12, N. Y.

small size producer of BIG SIZE SAVINGS in metal forming . . .



The New Cincinnati 8" Hydroform

The new Cincinnati 8" Hydroform duplicates the performance of its larger family members—the 12", 19", 23", 26", and 32" size machines—by producing a wide variety of deep drawn parts . . . with lower tooling costs . . . at a faster rate . . . and with higher standards of quality than is possible to obtain by other methods.

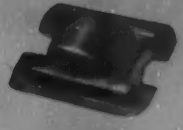
And it takes up less plant floor space than some soft drink dispensing machines occupy.

Typical examples of work formed on the 8" Hydroform are shown at left. Listed below is a table of major machine specifications.

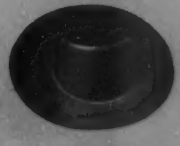
If your manufacturing requires the production of drawn shapes in small lots—or extensive development work prior to quantity production—let a Cincinnati Milling field engineer show you how the many Hydroforming advantages can be profitably applied to your work. For a description of the Hydroforming process and specifications of the six machine sizes, write for Bulletin M-1759-3.

Cross-over Duct of .035" Type 321 stainless steel, drawn with contoured flange in one operation.

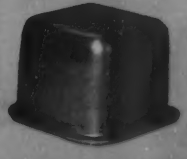
Reflector of .020" Aluminum, drawn, pierced and trimmed in one operation.



Electrical Detail of .042" stainless steel, drawn in two operations.



Jet Engine Detail of .032" Inconel, drawn with flange on an angle with the balance of the part in one operation.



Cover of .060" 2S0 Aluminum, drawn in one operation.

Work Capacity:
Maximum Blank Diameter—8"
Maximum Draw Depth—5"
Maximum Blank Gage—¼" Steel
Maximum Forming Pressure—15,000 psi

Machine Operating Rate:
Maximum—200 cycles per hour

Dimensions:
5' x 5' x 7½' high

Weight:
Machine Net—12,000 lbs.

Installation:
Floor Mounted. Requires water and electrical connections.

Hydroform

PROCESS MACHINERY DIVISION
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.

CINCINNATI

When all is said

Ask FEDERAL

FOR ANYTHING IN MODERN GAGES

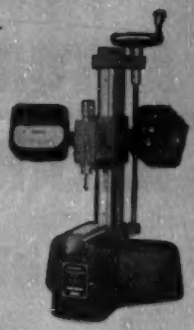
Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring,

1000 Series Adjustable Snap Gages

Adjustable Indicating Snap Gages 1340 Type

NB-60 Universal Comparator

K Series Deep Throat Gages



130 Electronic Comparator

and done . . .

Pitch Diameter and Spiral Gear Gage 202 Series

Which gage manufacturer has consistently produced the most complete line of reliable modern gages of practical design and dependable accuracy?

Ever since Federal offered its first Dial Indicator, 37 years ago, this company has consistently lead the way in improvements, new instruments, and new methods of gaging. First to realize the value of Quality Control by Statistics, Federal was also first to promote its use by educating men all over the country in its application.

On the other hand, Federal has consistently weighed new ideas and rejected hundreds that would not stand up to requirements. After all, you can safely entrust your gaging problems to a concern that has such a background.

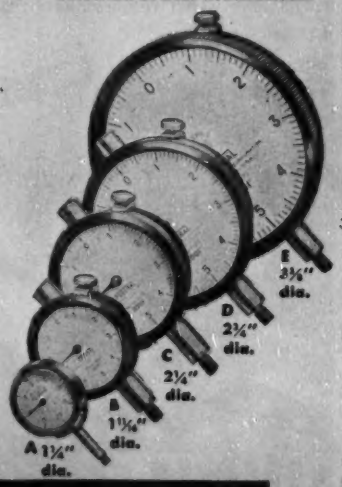
Moreover, Federal concentrates on the design and manufacture of dimensional gages — not only the wide variety of Indicator Gages shown here but also the most advanced type of Air Gages, Electric, and Electronic Gages — for continuous measuring, automatic sorting, and automatic dimensional control of parts produced on machine tools.

It's easy to investigate Federal Gages. Catalog 52 and our price list tell the whole story.

FEDERAL PRODUCTS CORPORATION
41211 Eddy Street • Providence 1, R. I.

Adjustable I.D. Groove Gage

Regular Dial Indicators Greatest Selection of Dial Graduations.



Sorting, or Automatically Controlling Dimensions on Machines

AUTOMATED BROACHING
BALANCED PRODUCTION
with two machines

ANOTHER

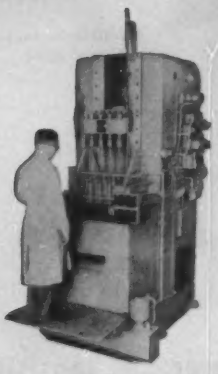
American

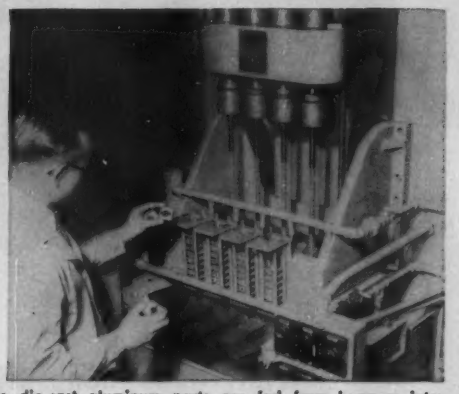
FIRST

This "working team" of two American Broaching Machines produces 3,000 rocker arm brackets per hour.

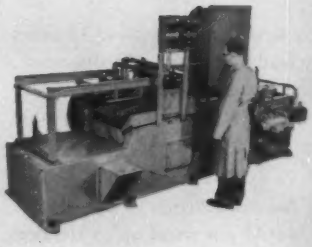
An American (VP) vertical hydraulic internal pull-up broaching machine, arranged for 4-station operation, broaches the ¾" diam. hole in the part. The part is then conveyed to a hydraulic broaching machine, which straddle broaches the sides of the parts. The feeds, broaching strokes and ejectors of the two machines are completely automated to provide continuous, balanced production.

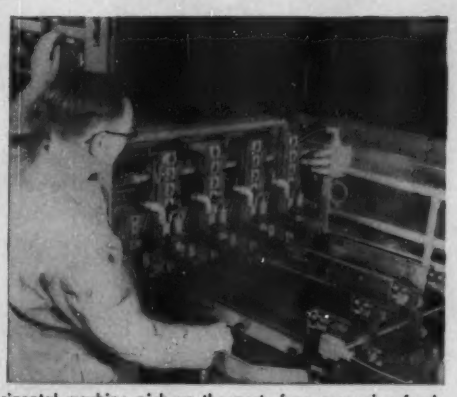
American machines, broaches and fixtures are made in sizes and types to fit your exact requirements. Why not let American engineers solve your broaching problems. Send a part print or sample. Ask for Catalog No. 450.



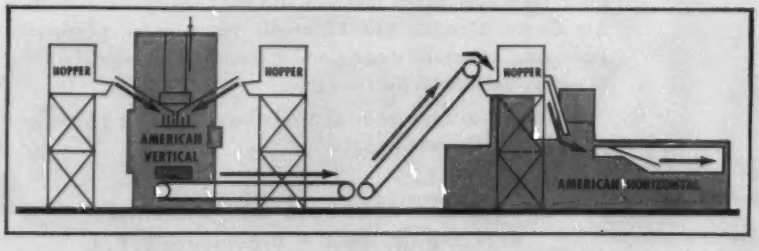


At the vertical machine, the die-cast aluminum parts are fed from hoppers into magazine feeds, the hole is broached and the parts automatically ejected onto a conveyor. Cycle is continuous.





Expanding arbors of the horizontal machine pick up the parts from magazine feeds and push them past stationary broaches which straddle broach the sides. Parts are ejected automatically on the return stroke.



American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

SUNDSTRAND

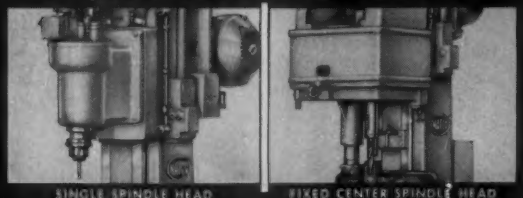
See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

NEW FEED and CONTROL MECHANISM *increases production!*

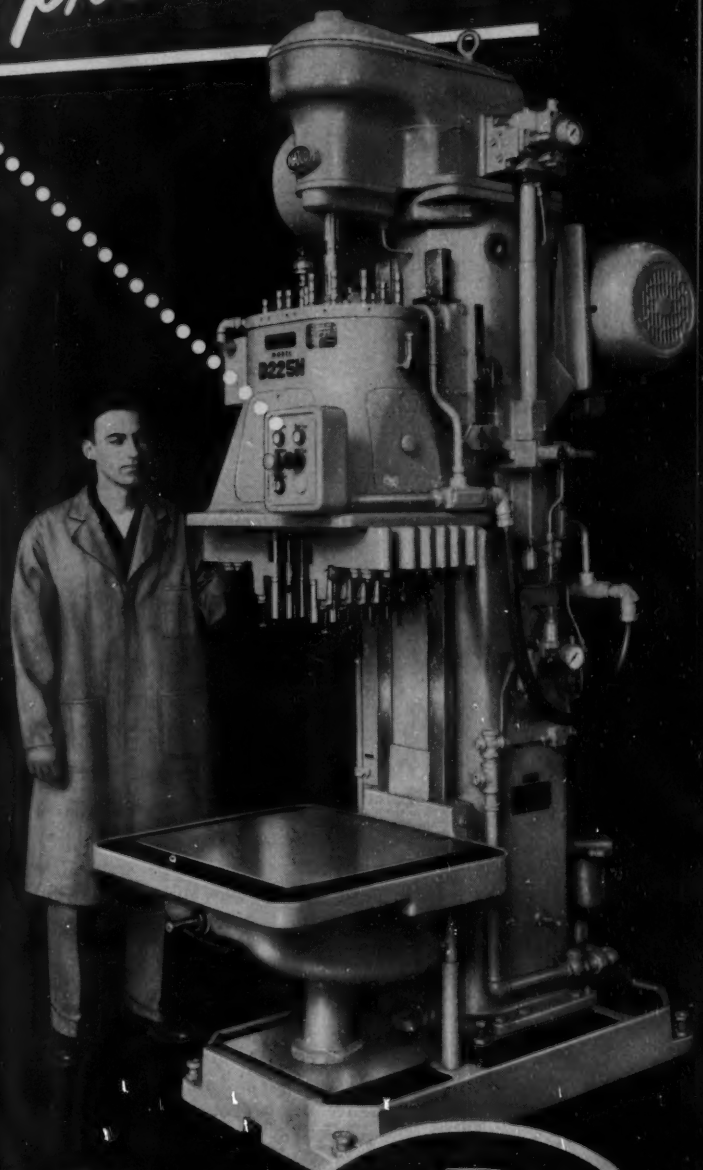
D225H MACHINE

AVAILABLE WITH

- ✔ SINGLE SPINDLE HEAD
- ✔ ADJUSTABLE SPINDLE HEAD
- ✔ FIXED CENTER SPINDLE HEAD



SINGLE SPINDLE HEAD — FIXED CENTER SPINDLE HEAD



...for medium size work new push button control reduces costs by speeding operations

POSSIBLE FEED CYCLES

1. STANDARD CYCLE—Rapid traverse forward, 1st or coarse feed forward, 2nd or fine feed forward, rapid reverse, stop.
2. JUMP FEED CYCLE—Additional Equipment. Rapid traverse forward, 1st or coarse feed forward, rapid traverse forward, 1st or coarse feed forward, 2nd or fine feed forward, rapid reverse, stop.
3. TIME DELAY REVERSE CYCLE—Additional Equipment. Rapid traverse forward, 1st or coarse feed forward, 2nd or fine feed forward, dwell against positive stop for predetermined time, rapid reverse, stop.

Call a Natco Field Engineer

to help you solve your problems in Drilling, Boring, Facing and Tapping

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

Branch Offices

CHICAGO, 2009 Engineering Bldg. • DETROIT, 10138 W. McNichols Rd.
BUFFALO, 1807 Elmwood Ave. • NEW YORK, 35 Beechwood Ave., Mount Vernon

A Minster Press means

LESS DIE REPAIR

These Minster Press features *protect* dies from needless expensive repairs.

1. Rugged Minster Frames assure the greatest rigidity with the least possible deflection.

2. Accurate alignment of slide face and bed is assured by Minster Design. Beds scraped to surface plate. Long slide ways scraped square to slide face. Gibs accurately ground and adjusted for proper clearance using ground spacers on all front gibs of presses over 60 tons.

3. Minster bearing bushings honed to proper clearance thus reducing impact shock and snap-thru backlash.

4. Minster patented Combination Air Friction Clutch and Brake has smooth shock absorbing action which tends to reduce die wear caused by impact. Fast controlled engagement or disengagement on 360° surfaces gives opportunity for operator to stop slower presses before dies close in case of misfeed. It also makes possible the use of precision switches in dies to anticipate misfeeds on automatic operations and stop press before serious damage occurs.

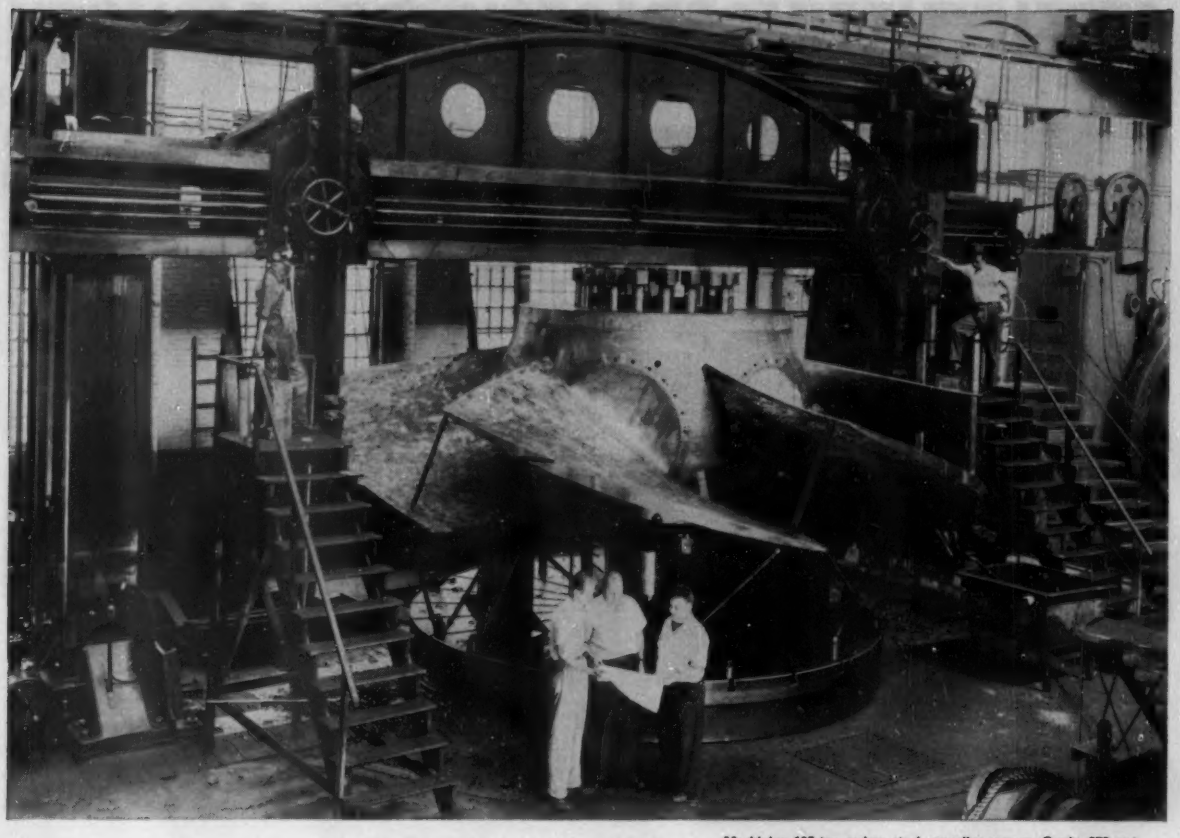
Build a sound replacement program modernize with Minster Presses

THE MINSTER MACHINE COMPANY

MINSTER, OHIO

MINSTER®

PRESSES



Machining 165-ton carbon steel propeller runner, Grade 370 cut heavy scale at three times former speed, with 88% less downtime. Speed—154 SFPM. Feed—1/32 inch. Depth of Cut—7/16 inch.

From on-the-job reports

PRODUCTION INCREASES UP TO 30% WITH NEW CARBOLOY® SERIES 300 STEEL-CUTTING CARBIDES

Case histories, on these pages, prove Grades 350 and 370 outperform other carbides on tough steel-cutting jobs.

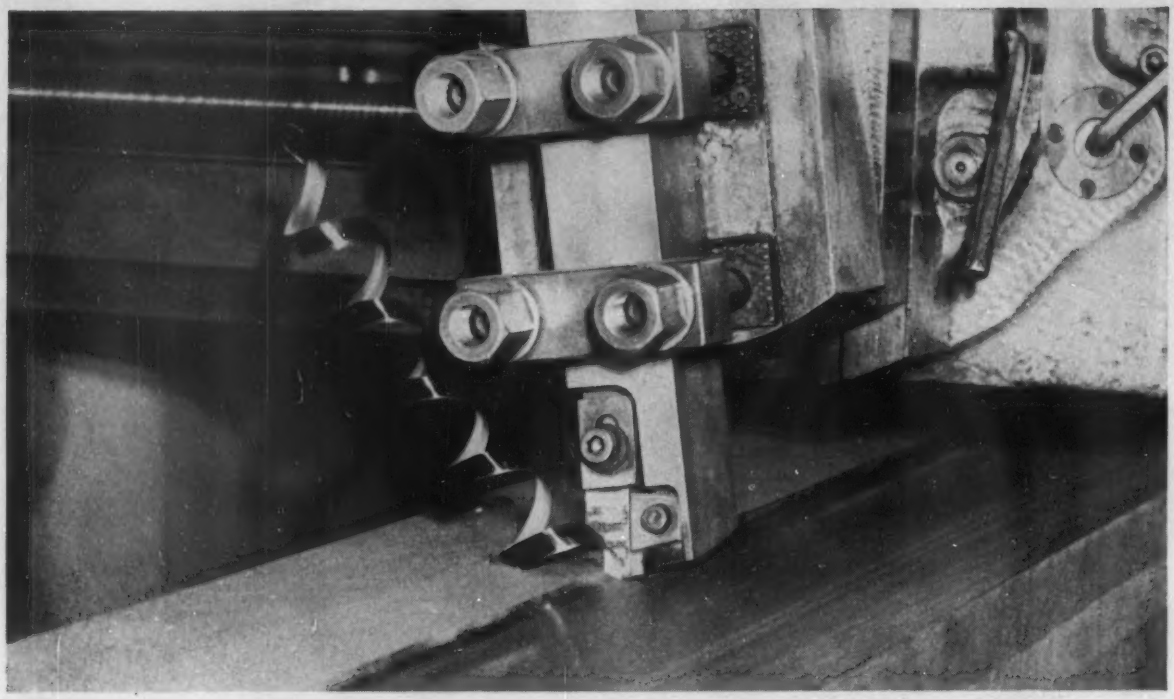
Carboloy Grades 350 and 370 are capable of cutting more cubic inches of steel per minute, with longer tool life, than any other carbides. This has been *proved* on in-the-plant applications, where these grades have boosted production as much as 30% over previous carbides used.

Grade 350 for medium-duty steel cutting, and Grade 370 for heavy-duty steel cutting, are the first of a new family of carbides manufactured by an entirely new process.

Both grades have a built-in structural rigidity that enables them to operate at temperatures as high as 1800°F without the tip deformation found in other carbides. They combine superior wear resistance and extreme toughness to a degree never before possible.

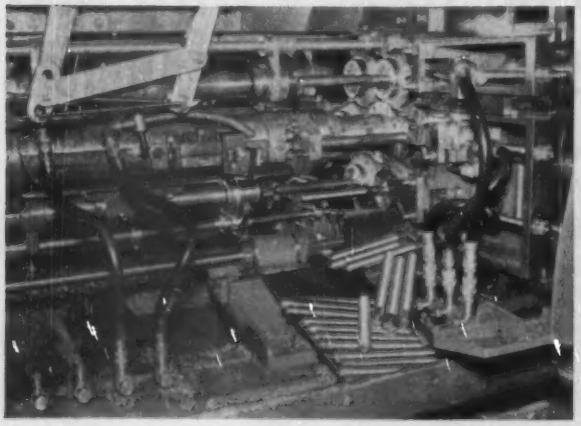
Case histories, operating data on following pages

STEEL-CUTTING CASE HISTORIES WITH



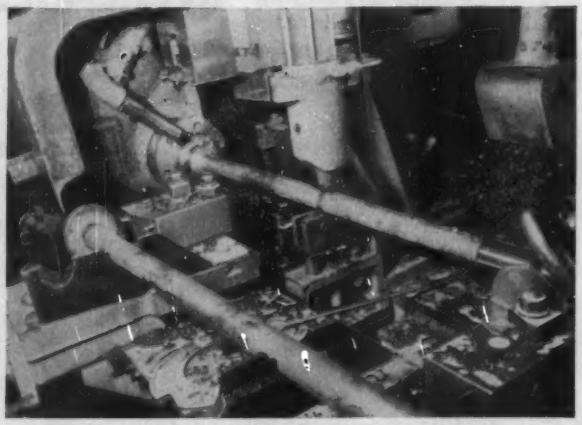
UNDERARM. A single Carboloy Grade 370 clamped-on tip planed all four sides of this normalized steel weldment at 300 surface feet per minute, without regrinding. Despite the large size (12″ x 14″ x 164″) wear on the carbide tip was only 0.010″.

SETUP: Material—1020 steel weldment, normalized. **Speed**—300 SFPM. **Feed**—0.060 inch per stroke for roughing; 0.080 inch per stroke for semifinishing. **Depth of cut**—⅜ inch for roughing; 0.030-0.040 inch for semifinishing. **Coolant**—No.



THREADED LEVELING SCREWS. Carboloy Grade 370 tools, used on 6-spindle Cone Automatic, boosted production to 944 screws per hour, compared to 140 with steel tools.

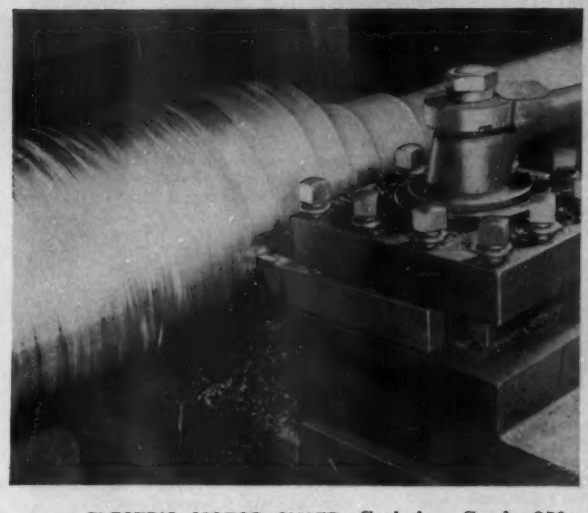
SETUP: Material—SAE B1112 1-inch diameter steel screw stock. **Speed**—1586 RPM for threading. **Feed**—0.005 inch for chamfering and cutoff. **Coolant**—Yes.



TRUCK AXLE FORGING. Turning with Grade 350 resulted in 33% more pieces per tool. Chipping and flaking, encountered with previously used tools, were eliminated.

SETUP: Material—AISI 4150 steel forging. **Speed**—200 SFPM on 2-inch diameter; 400 SFPM on 4-inch diameter. **Feed**—0.014 inch. **Depth of cut**—1/16-⅛ inch. **Coolant**—Yes.

NEW CARBOLOY GRADES 350 AND 370



ELECTRIC MOTOR SHAFT. Carboloy Grade 350 increases the number of linear inches cut by 30% over other carbides used for roughing and finishing this large steel motor shaft.

SETUP: Material—AISI 1045 modified (hot-rolled) with varying heat analysis. **Speed**—300 SFPM. **Feed**—0.020 inch. **Depth of cut**—1/16 to 1/8 inch. **Coolant**—Yes.

JET ENGINE TURBINE WHEEL RIMS. With Grade 370, G. E. got 300% increase in life of tools used for turning, boring and facing cold-worked Timken steel rims. Downtime was reduced two thirds.

SETUP: Material—Cold-worked, forged Timken steel. **Speed**—160 SFPM on O.D.; 110 SFPM on I.D. **Feed**—0.010 inch. **Depth of cut**—1/2 to 7/8 inch. **Coolant**—Yes.

Full stocks now available from Authorized Carboloy Distributors

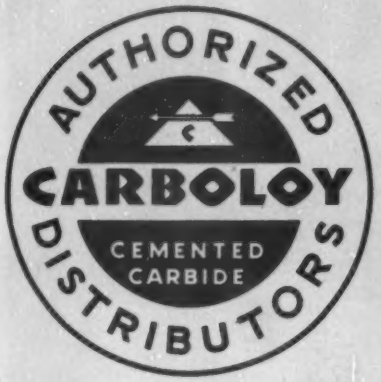
Standard Carboloy Tools are available in Grades 350 and 370. In addition, blanks and inserts of each grade are available in a wide range of styles and sizes.

Carbides for any machining job. Regardless of your particular machining problem, a grade of Carboloy cemented carbide is available to handle it. Over a quarter century of experience in machining ferrous and nonferrous, metallic and nonmetallic materials has been acquired by the Carboloy organization. See your Authorized Carboloy Distributor or Carboloy salesman for qualified, expert machining assistance.

Your local Authorized Carboloy Distributor is listed on the next page . . .

AUTHORIZED CARBOLOY DISTRIBUTORS

NATIONWIDE AVAILABILITY AND SERVICE



ALABAMA
Birmingham 2—The Young & Vann Supply Co.
Mobile—Oliver H. Van Horn Co., Inc.

ARIZONA
Phoenix—McConkey-Docker & Company

CALIFORNIA
Los Angeles 58—Garrett Supply Company
Los Angeles 58—Machinists' Tool & Supply Co.
Oakland 7—C. W. Marwedel
San Diego 1—Acme Tool & Supply
San Francisco 3—C. W. Marwedel
San Jose—Industrial Tool & Supply Co.

COLORADO
Denver 17—Mine & Smelter Supply Co.

CONNECTICUT
Bridgeport 1—The Hawley Hardware Co.
Hartford 1—Silliter-Holden, Inc.
Waterbury—The White Supply Company

FLORIDA
Jacksonville 1—The Cameron & Barkley Co.
Miami 5—The Cameron & Barkley Co.
Orlando—The Cameron & Barkley Co.
Tampa 1—The Cameron & Barkley Co.

GEORGIA
Atlanta 3—Pye-Barker Supply Company
Savannah—The Cameron & Barkley Co.

HAWAII
Honolulu 1—American Factors, Ltd.

ILLINOIS
Aurora—Dietz Industrial Supply
Chicago 6—Samuel Harris & Company
Chicago 7—Screw Machine Supply Co.
Chicago 6—Supplies, Inc.
Peoria 2—Couch & Heyle, Inc.
Rockford—Samuel Harris & Company
Rockford—Rockford Tool & Transmission Co.
Springfield—Screw Machine Supply Co.
Waukegan—Samuel Harris & Company

INDIANA
Fort Wayne 5—Tools & Abrasives, Inc.
Indianapolis 4—Tools & Supplies, Inc.
Indianapolis 9—Vonnegut Hardware Company
South Bend 24—South Bend Supply Company

IOWA
Davenport—Davenport Engineering Co.
Sioux City 10—Sioux Machinery & Supply Co.
Sioux City 1—Smith Electric and Supply Co.

KANSAS
Wichita—Ellfeldt Machinery & Supply Co.

KENTUCKY
Louisville 3—Louisville Mill Supply Co.

LOUISIANA
Baton Rouge—Oliver H. Van Horn Co., Inc.
New Orleans 6—Edgar Murray Supply Co., Inc.
New Orleans 1—Oliver H. Van Horn Co., Inc.
Shreveport—Harris Frederic & Co., Inc.
Shreveport—Oliver H. Van Horn Co., Inc.

MARYLAND
Baltimore 2—The L. A. Benson Co., Inc.
Baltimore 1—The W. L. Reynolds Co.

MASSACHUSETTS
Boston 15—Arthur A. Crafts Co., Inc.
West Springfield—Peaslee-Wells, Inc.
Worcester 8—Brierly, Lombard & Co., Inc.

MICHIGAN
Battle Creek—Kendall Hardware-Mill Supply Co.
Detroit 26—The Chas. A. Strelinger Company
Ferndale—Sterling Supply Company
Flint 2—Geo. W. Hubbard Hardware Co.
Grand Rapids 9—A. L. Holcomb Company
Jackson—C. E. Hamlin Company
Kalamazoo—Kendall Hardware-Mill Supply Co.
Lansing 29—Mill Supplies Corporation
Muskegon—Muskegon Hardware & Supply Co.
Port Huron—Beard Campbell Company
Saginaw—Mahar Tool Supply Co., Inc.

MINNESOTA
Minneapolis 1—The John C. Eide Co.
Minneapolis 4—The Satterlee Company

MISSISSIPPI
Jackson—Dilworth of Mississippi, Inc.

MISSOURI
Kansas City 6—Ellfeldt Machinery & Supply Co.
St. Louis 6—Sligo, Inc.
St. Louis 3—Tools & Supplies, Inc.

NEBRASKA
Omaha—The Balbach Company

NEW JERSEY
Kearney—A. N. Nelson, Inc.
Newark 2—Squier, Shilling & Skiff, Inc.
Trenton 8—Wiley-Hughes Supply Co., Inc.
Woodbridge—Hansen & Yorke Co., Inc. of New Jersey

NEW MEXICO
Albuquerque—Gorman Engineering Company

NEW YORK
Albany 1—Sager-Spuck Supply Co., Inc.
Binghamton—Syracuse Supply Company
Brooklyn 31—A. N. Nelson, Inc.
Buffalo 23—Austin Ford Logan, Inc.
Buffalo 2—R. C. Neal Company, Inc.
Elmira Heights—R. C. Neal Company, Inc.
New York 7—Hansen & Yorke Co., Inc.
Rochester 6—R. C. Neal Company, Inc.
Rochester—Syracuse Supply Company
Syracuse—Austin Ford Logan, Inc.
Syracuse 1—Syracuse Supply Company
Utica—Syracuse Supply Company

NORTH CAROLINA
Charlotte—The Henry Walke Co.
Winston-Salem—Atlas Supply Company

OHIO
Akron 4—Service Tool & Supply Company
Canton 1—Service Tool & Supply Company
Cincinnati 2—E. A. Kinsey Company
Cleveland 13—Strong, Carlisle & Hammond Co.
Columbus 13—E. A. Kinsey Company
Dayton—Dayton Supply & Tool Co.
Dayton 2—E. A. Kinsey Company
Toledo 1—Mill & Factory Supply Co.

OKLAHOMA
Duncan—Duncan Equipment Company
Oklahoma City—Marshall Supply & Equipment Co.
Tulsa 1—Marshall Supply & Equipment Co.

OREGON
Portland 4—J. E. Haseltine & Company

PENNSYLVANIA
Allentown—Wm. H. Taylor & Co., Inc.
Erie—Erie Mfg. & Supply Corp.
Harrisburg—Raub Supply Company
Lancaster—Raub Supply Company
Philadelphia 7—Alden Supply Company
Philadelphia 25—Theo. C. Ulmer, Inc.
Pittsburgh 3—Harris Pump & Supply Company
Reading—Seaman Mill Supplies, Inc.
Scranton 2—The Bittenbender Company
Williamsport 34—Lowery Electric Company, Inc.
York—W. S. Ehrenfeld Co.

RHODE ISLAND
Providence 1—Providence Mill Supply Co.

SOUTH CAROLINA
Charleston—The Cameron & Barkley Co.
Greenville—Poe Hardware & Supply Co.

TENNESSEE
Chattanooga—Mills & Lupton Supply Co.
Knoxville 1—W. S. Murrian Company
Memphis 2—J. E. Dilworth Company

TEXAS
Dallas 4—Briggs-Weaver Machinery Co.
Dallas 1—Tool Supply & Engineering Co.
El Paso—El Paso Saw & Belting Supply Co.
Fort Worth—Briggs-Weaver Machinery Co.
Fort Worth 1—Oliver H. Van Horn Co., Inc.
Houston 11—Briggs-Weaver Machinery Co.
Houston 11—A. J. Rod Company, Inc.
Houston—Oliver H. Van Horn Co., Inc.

UTAH
Salt Lake City 1—Mine & Smelter Supply Co.

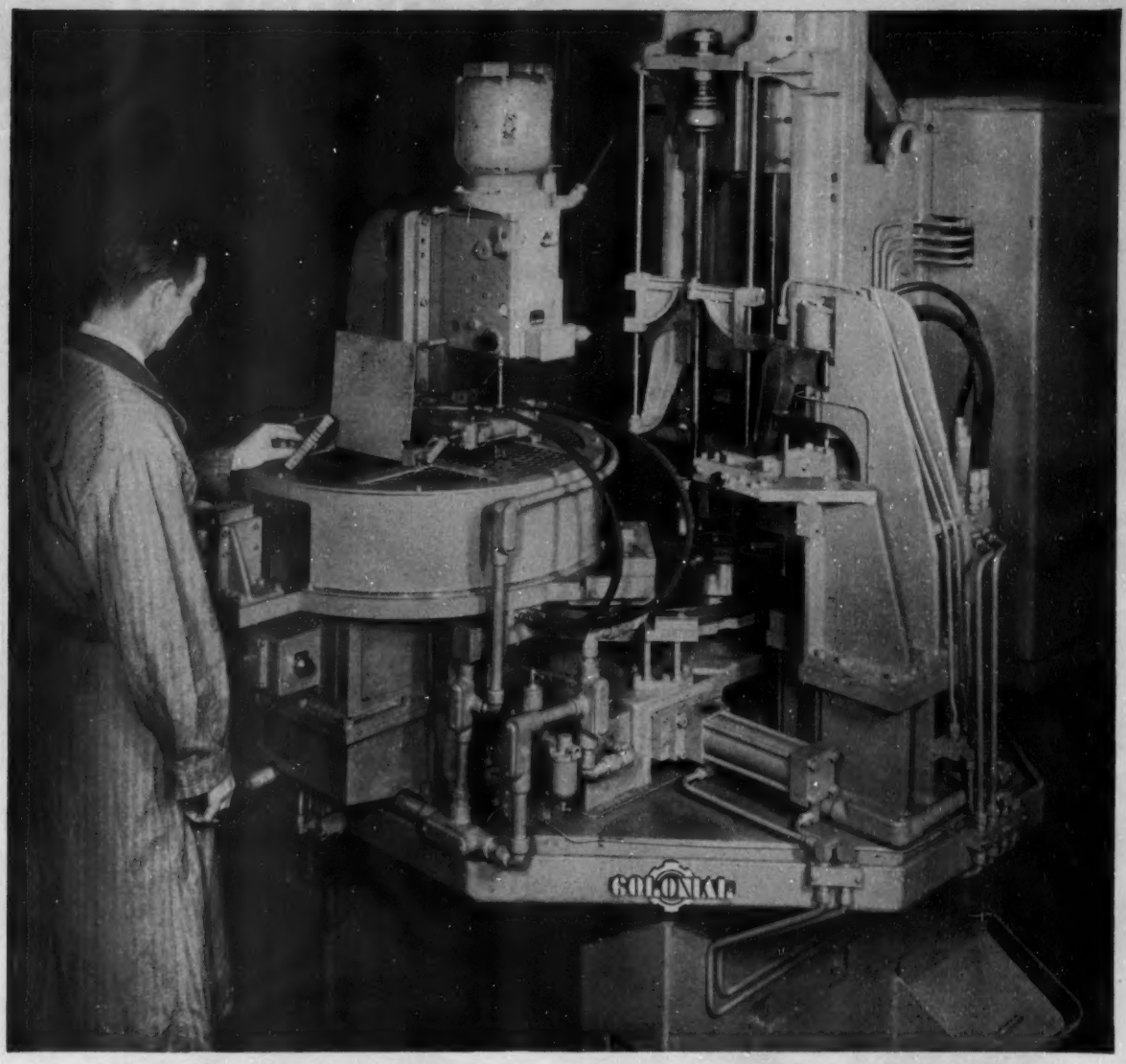
VIRGINIA
Norfolk 1—Empire Machinery & Supply Corp.
Norfolk 10—The Henry Walke Co.
Richmond 15—Industrial Supply Corp.

WASHINGTON
Seattle 4—J. E. Haseltine & Company
Spokane 11—J. E. Haseltine & Company

WISCONSIN
Milwaukee 1—Rickert Industrial Supply Co.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11149 East 8 Mile Road, Detroit 32, Michigan



BROACHING—"PLUS"

200 finished pieces per hour

This Colonial 6-ton 24-inch stroke pull-down machine, broaches, drills and stamps more than 200 camshaft sprockets per hour. Cycle is completely automatic as follows: 1) drill .2656" hole in web, 2) broach .1895" keyway in bore, 3) stamp timing mark on sprocket, 4) eject completed parts onto a conveyor. Operator merely keeps loading magazines filled with parts.

Broaching-"Plus" is a new trend in broaching machines today. Integrating broaching into a machining sequence on a part, so that the operator has less work handling, cuts costs and speeds up processing.

Colonial Broaching-"Plus" machines can perform multiple operations on your parts. For information on how your costs can be cut, send your prints and production requirements to Colonial Broach Company's Engineering Department.

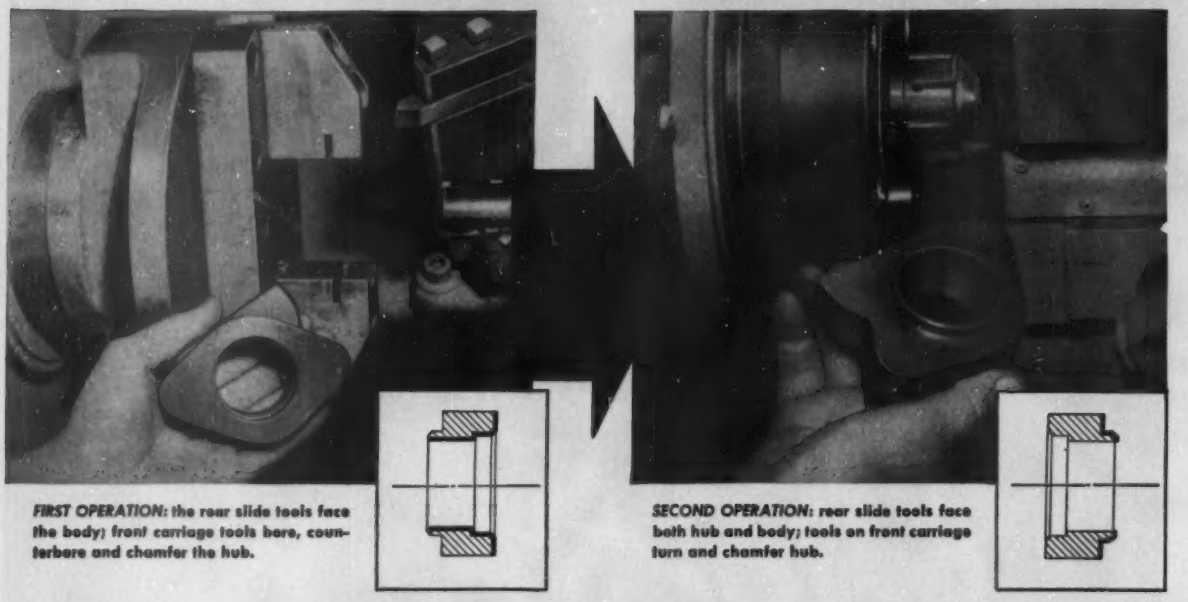
UNIFIED BROACHING is the key to successful broaching

PIONEERS OF H.S.S. BROACHING

COLONIAL BROACH CO. DETROIT 13

Quick "pass-along" idea

INCREASES PRODUCTION



FIRST OPERATION: the rear slide tools face the body; front carriage tools bore, counterbore and chamfer the hub.

SECOND OPERATION: rear slide tools face both hub and body; tools on front carriage turn and chamfer hub.

with pair of GISHOLT No. 12 Hydraulic Automatic Lathes

The Gisholt No. 12 Hydraulic is a versatile 12" Automatic Lathe which combines speed and accuracy with easy setup. Ideal for both chucking and between-centers work.

One operator with two standard machines now handles these cast iron manifold bodies in rapid succession—at a pace of 80-per-hour, at 80% efficiency.

This two-machine team pays off many ways: The operator loads and unloads one machine while the other is working—*automatically.* Investment is at a minimum because both machines *and* tooling are standard. Tool setups and replacements are simple.

Whether you have continuous runs like this or even smaller job lot work—the speed and automatic operation of the Gisholt No. 12 Hydraulic may be your answer to lower costs. It's worth investigating.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

"STANDARD for cutting metal and costs since 1881"

Red Shield says:

Cut machining costs . . . standardize with Standard. Complete line . . . top quality tools. Backed by factory application specialists coast to coast. Distributors in all principal cities.

STANDARD TOOL CO.

3950 CHESTER AVENUE — CLEVELAND 14, OHIO

FACTORY BRANCHES IN: NEW YORK • DETROIT • CHICAGO • DALLAS • SAN FRANCISCO

THE STANDARD LINE: *Twist Drills · Reamers · Taps · Dies · Milling Cutters · End Mills · Hobs · Counterbores · Special Tools*

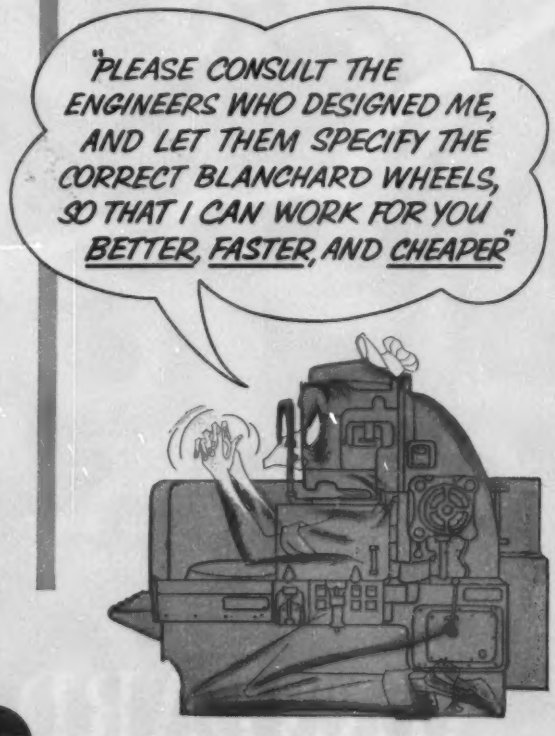
UNCLE!

Are your machines begging for mercy because of misuse?

Blanchard Grinders, *with proper grinding wheels, can* and *do* give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 high-speed cam plates were ground on both sides in 1¾ hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results—90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of ±.0002, and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders — let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.


"PLEASE CONSULT THE ENGINEERS WHO DESIGNED ME, AND LET THEM SPECIFY THE CORRECT BLANCHARD WHEELS, SO THAT I CAN WORK FOR YOU BETTER, FASTER, AND CHEAPER"

Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding." Write for free copies today!

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

THE MORE KNOW-HOW YOU PUT IN THE BARREL, THE MORE PROFIT YOU TAKE OUT

Useful facts gathered during Oakite's years of experience in barrel finishing are packed like #12 stones in this 10-page booklet covering such subjects as:

PRECLEANING—Good tank cleaning; Good barrel cleaning; Good rinsing saves money.

CUTTING DOWN, DEBURRING—Good solutions; Abrasive media, water and work ratios, etc.

PICKLING, DESCALING, BRIGHT DIPPING—Good solutions for steel, brass, aluminum, etc.

BURNISHING—Good solutions; Burnishing media; water and work ratios, etc.; How to overcome water hardness; How to keep barrels and media clean; How to prevent rusting, tarnishing and other corrosion.

FREE... For your copy of *"May I put my head in your finishing barrel?"* just write or mail the coupon.

Technical Service Representatives in Principal Cities of U.S. and Canada

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC.
24 Rector St., New York 6, N. Y.

Send me a FREE copy of your booklet on Barrel Finishing.

Name _____

Company _____

Address _____

- **SALES ENGINEERING . . .** engineers and production men draw on extensive experience and up-to-date knowledge to recommend money-making lathe techniques, backed up with production and cost estimates.
- **EXPERIMENTAL FACILITIES . . .** concentrated on new lathe and FLOTURN development proving "impossible" jobs can be done with time and money saved!
- **TOOLING . . .** lathe tooling experts develop the most efficient tooling for better results, lowest cost production.
- **DEMONSTRATION ROOM . . .** a big "showroom," with representative lathes, where you can see your part turned on Lodge & Shipley Lathes or produced by FLOTURN, proving estimated time and cost figures.
- **TRAINING . . .** expert demonstrators are available to provide in-your-plant operator training.
- **MANUALS . . .** exceptionally complete operator's manuals minutely detail every step in the proper installation and operation of your Lodge & Shipley Lathes.
- **SLIDE FILMS . . .** detailed presentation of Lodge & Shipley Lathe features and what they mean in accuracy, productivity, low-cost operation.
- **MOVIE . . .** new, color-sound 16mm film reveals Lodge & Shipley services and facilities. (Available soon.)
- **LITERATURE . . .** objective-type bulletins on all Lodge & Shipley Lathes plus a long series of case histories detailing results.

Here's help in doing lathe jobs better, faster and at lower cost! A wide range of valuable services—many of them free—all designed to help the lathe user solve his production problems. For more information without obligation on any of the above services, write today to:

THE Lodge & Shipley COMPANY 3055 Colerain Ave., Cincinnati 25, Ohio.

"hidden strength to give maximum support and stability"

FIG. 2 *Complex Meehanite bed casting requires better properties, superior foundry control.*

Meehanite Castings Specified

The headline above is a direct quotation. This is what Pratt & Whitney, Division Niles-Bement-Pond Company have to say about their reasons for specifying Meehanite castings for the components of the No. 4E Jig Borer shown in Fig. 1.

The importance of these castings in maintaining accuracy with work loads up to 5,000 pounds is obvious. Each must be properly designed to meet these demands—high strength, uniformity and solidity are essential.

The bed casting shown in Fig. 2 illustrates the complexity of design required for this machine tool. Production of units of this type requires a high degree of control of all foundry process plus the superior engineering properties available in Meehanite castings.

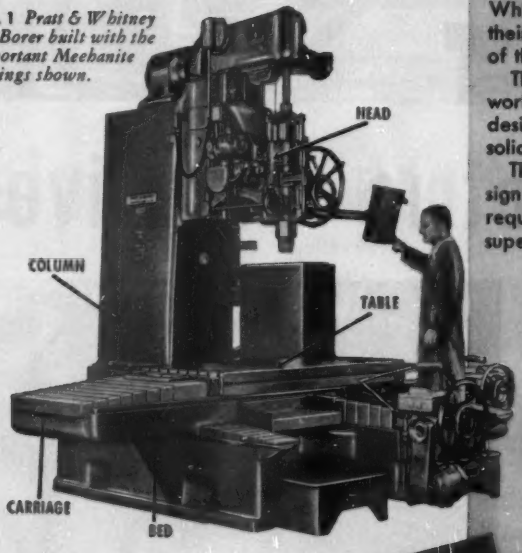


FIG. 1 *Pratt & Whitney Jig Borer built with the important Meehanite castings shown.*

For other applications of Meehanite metal in the Machine Tool Industry, write for a copy of this bulletin. Among its 24 pages you will find many applications which may be of help to you.

MEEHANITE®

714 North Avenue
NEW ROCHELLE, N. Y.

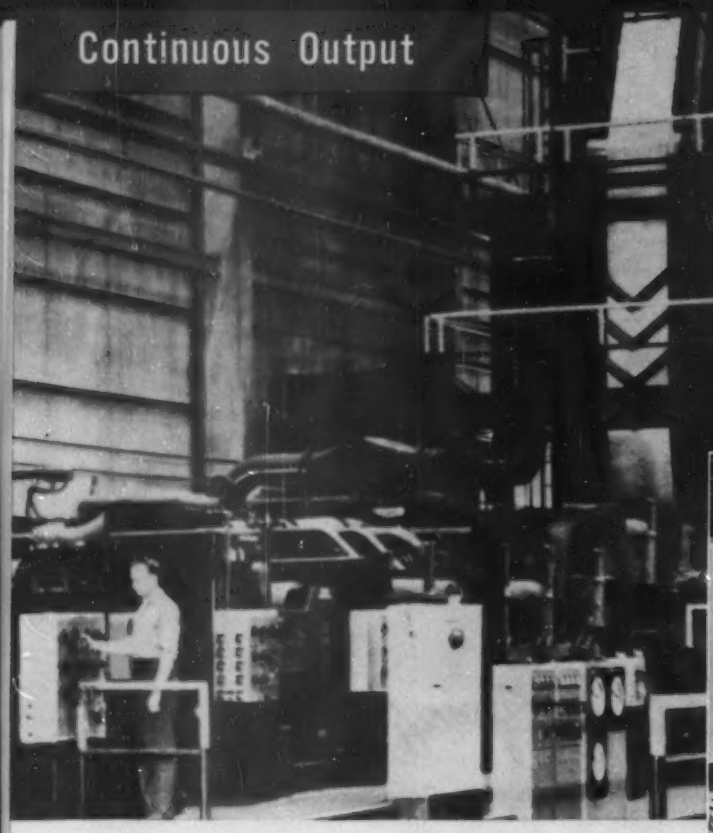
MEEHANITE MEANS BETTER CASTINGS

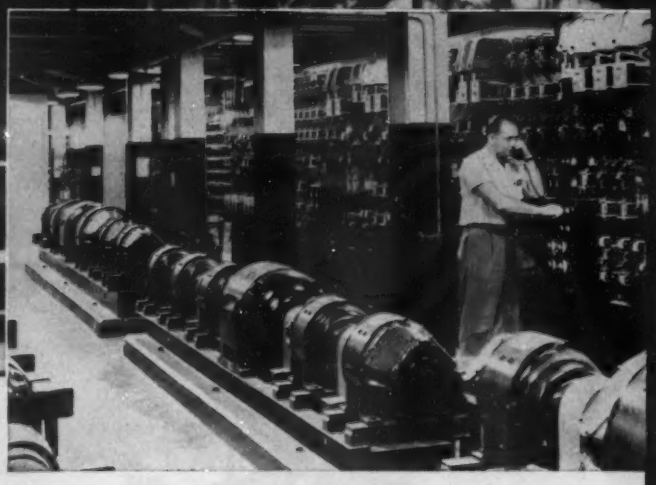
MEEHANITE FOUNDRIES

American Brake Shoe Co.	Mahwah, New Jersey
The American Laundry Machinery Co.	Rochester, New York
Atlas Foundry Co.	Detroit, Michigan
Banner Iron Foundry	St. Louis, Mo.
Barnett Foundry & Machine Co.	Irvington and Dover, New Jersey
E. W. Bliss Co.	Hastings, Mich. and Toledo, O.
Builders Iron Foundry	Providence, Rhode Island
Compton Foundry	Compton, Calif.
Continental Gin Co.	Birmingham, Alabama
The Cooper-Bessemer Corp.	Mt. Vernon, Ohio and Grove City, Pa.
Crawford & Doherty Foundry Co.	Portland, Oregon
De Laval Steam Turbine Co.	Trenton, N. J.
M. H. Detrick Co.	Newark, N. J. and Peoria, Ill.
Empire Pattern & Foundry Co.	Tulsa, Oklahoma
Ferrel-Birmingham Co., Inc.	Ansonia, Connecticut
Florence Pipe Foundry & Machine Co.	Florence, New Jersey
Fulton Foundry & Machine Co., Inc.	Cleveland, Ohio
General Foundry & Manufacturing Co.	Flint, Michigan
Georgia Iron Works Co.	Augusta, Ga.
Greenlee Foundry Co.	Chicago, Illinois
The Hamilton Foundry & Machine Co.	Hamilton, Ohio
Hardinge Company, Inc.	New York, New York
Hardinge Manufacturing Co.	York, Pennsylvania
Johnstone Foundries, Inc.	Grove City, Pennsylvania
Koehring Co.	Milwaukee, Wis.
Lincoln Foundry Corp.	Los Angeles, California
London Concrete Machinery Co., Ltd. (Hartley Fdry.)	Brantford, Ontario
E. Long Ltd.	Orillia, Ontario
Otis Elevator Co., Ltd.	Hamilton, Ontario
Palmyra Foundry Co., Inc.	Palmyra, New Jersey
The Henry Perkins Co.	Bridgewater, Massachusetts
Pohlman Foundry Co., Inc.	Buffalo, New York
The Prescott Co.	Menominee, Mich.
Rosedale Foundry & Machine Co.	Pittsburgh, Pennsylvania
Ross-Meehan Foundries	Chattanooga, Tennessee
Shenango-Penn Mold Co.	Dover, Ohio
Sonith Industries, Inc.	Indianapolis, Ind.
Standard Foundry Co.	Worcester, Massachusetts
The Stearns-Roger Manufacturing Co.	Denver, Colorado
Traylor Engineering & Mfg. Co.	Allentown, Pennsylvania
Valley Iron Works, Inc.	St. Paul, Minnesota
Vulcan Foundry Co.	Oakland, Calif.
Warren Foundry & Pipe Corporation	Phillipsburg, New Jersey
Washington Iron Works	Seattle, Washington

"This advertisement sponsored by foundries listed above."

Continuous Output

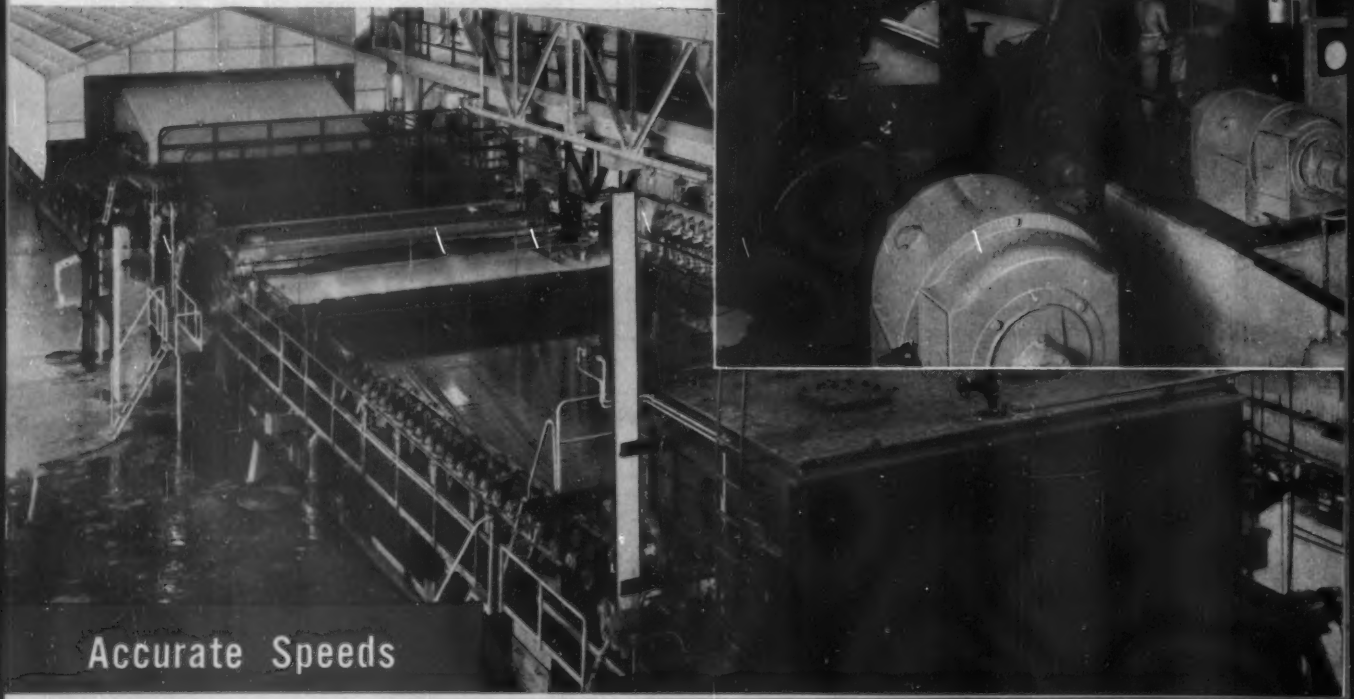




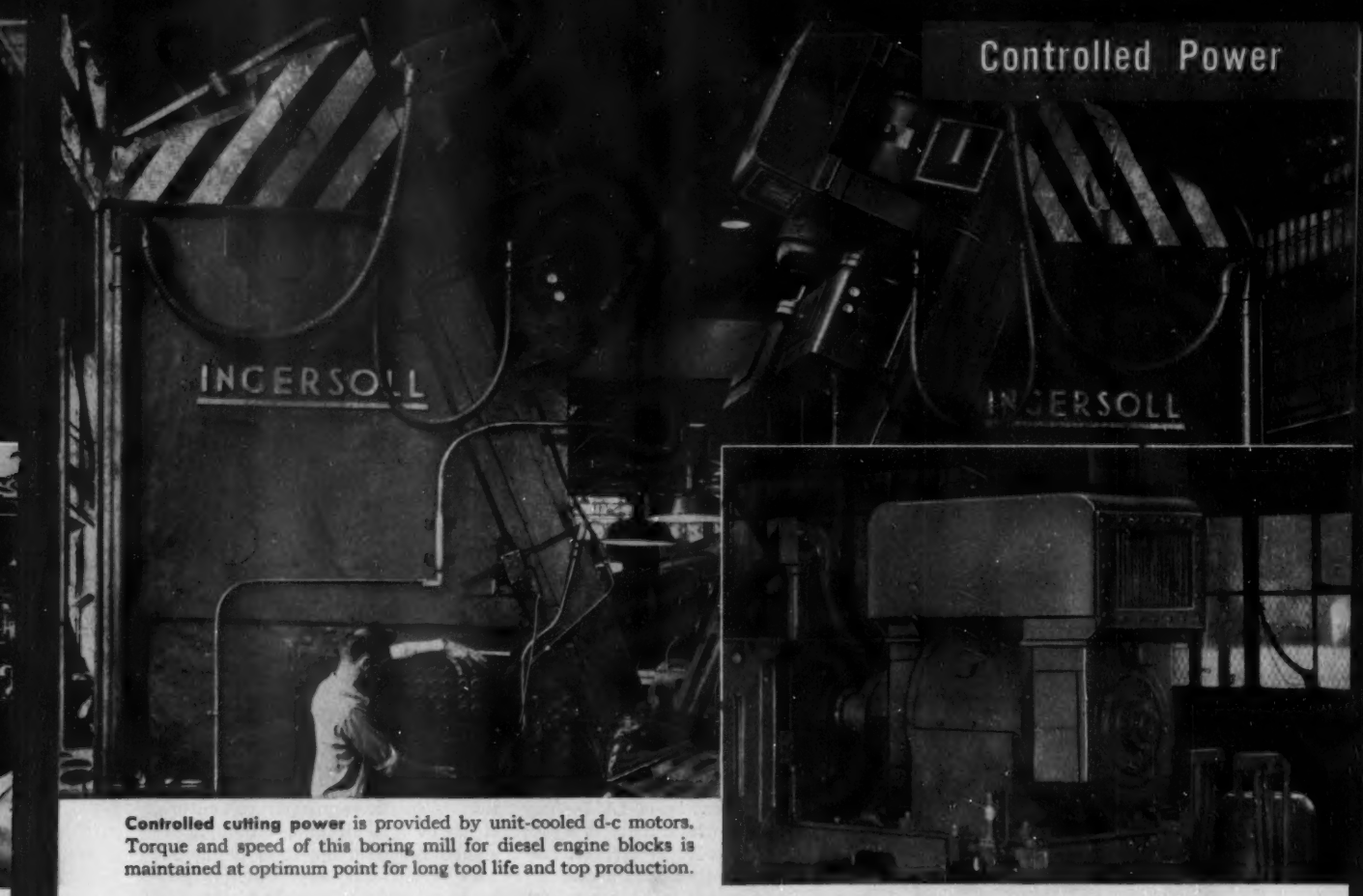
Co-ordinated G-E drive and furnace help produce up to 30 tons/hour of annealed strip. Adjustable voltage d-c generators co-ordinated by modern control provide smooth, fast, precise operation.

How General Electric d-c drives

Accurate speed from d-c drive co-ordinates sections of paper machine into fast flow of production—up to 300 tons/day. Mechanical design of machine is simplified, output increased.



Accurate Speeds



Controlled cutting power is provided by unit-cooled d-c motors. Torque and speed of this boring mill for diesel engine blocks is maintained at optimum point for long tool life and top production.

help make production automatic

DC MOTORS STEP UP PRODUCTION THROUGHOUT INDUSTRY

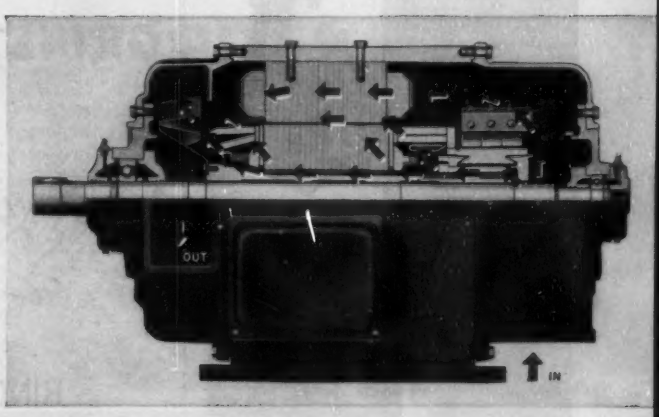
DC drives give you precise control of torque, speed, and power —essential in automatic production. The degree of precision depends on the steady performance and continuity of service of d-c motors and generators. In applications requiring close speed regulation, quick reversing, severe peak loads, G.E.'s complete line of Type CD-1000 motors is:

ECONOMICAL—the right speed at all times means less waste, fast production and low manufacturing costs per unit.

EASY TO MAINTAIN—built for long life with occasional inspection only—easily removable inspection covers. All connections are enclosed, yet easily accessible.

VERSATILE—Today's industry is more automatic than ever before. Regardless of application—in steel, paper, machine tool, and many other industries—G-E direct-current motors have gained the reputation of delivering continuous output at lower costs and accurate speeds for peak production.

FOR MORE INFORMATION, contact your nearest Apparatus Sales representative, or write for bulletin GEA-5497, general-purpose d-c motors, or GEA-6091A, totally-enclosed unit-cooled d-c motors. Section 810-4, General Electric Co., Schenectady, N. Y.



Excellent ventilating system gives positive ventilation to entire motor. Shaft fan on armature helps dissipate heat and keeps motor within rated temperature rise.

GENERAL ELECTRIC

Keep Your on the OLIVER Line — Cost Cutting Production Boosting MACHINE TOOLS

OLIVER DRILL POINTERS

Properly machine ground drills give better performance. OLIVER Drill Pointers, with each lip doing equal work, give balanced cuts—more accuracy—more perfect holes—more efficiency—longer drill life.

As Illustrated:

No. 21 Oliver Bench Drill Grinder. Hand operated for Drills No. 57 to 1/2".

No. 510. For Drills 1/4 to 3"—2-3-4 flute.

OLIVER DIE MAKING MACHINES

Efficient, speedy and accurate — effecting great savings in time and costs. Skilled labor is not required for sawing, filing and tapping operations.

Available in 5 Models.

Bench Model S-1 (Illustrated) — Single Speed Die Maker for use on Tool Steel up to 1" Thick.

Heavy Duty Model (Illustrated) — 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

OLIVER ACE UNIVERSAL TOOL & CUTTER GRINDERS

Keep your most difficult cutters sharp with Oliver ACES. They excel on high speed and Tungsten-Carbide work. Direct reading for clearances reduces fatigue — eases operators' jobs.

The ACE excels for grinding face mills up to 15" —also, slab mills • slitting saws • all types cutters and reamers.

2 Models: Heavy Duty (Illustrated) and Standard.

OLIVER 20" TEMPLATE TOOL BIT GRINDER

Efficiently powered by a 3 h.p. motor, this OLIVER Machine grinds on the periphery of a 20" wheel. Capacity: tools up to 1 1/2" wide x 1 3/4" high; from 0 to 20° clearance. The OLIVER is developed for production sharpening of single point Tungsten Carbide and high speed tools—offers increased production, lower tool costs and savings in man hours. Extremely fine finish assured.

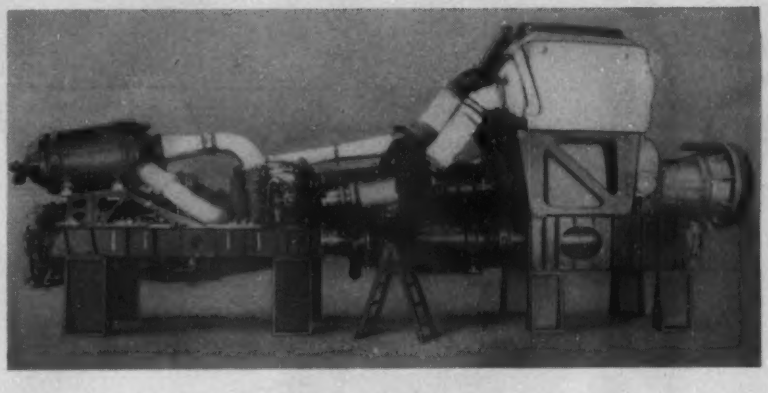
Write Today For Complete Information

OLIVER INSTRUMENT CO.

1414 E. MAUMEE · ADRIAN, MICHIGAN

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS



There's More Than One

I refer to a recent issue (*AM*—Aug 30 '54, p132) in which there is a picture of the Rolls-Royce Griffon marine engine, together with a description which appears to be a mixture of information about this engine and our R.M. 60 marine gas turbine.

The Griffon engine is a conversion of the aero piston engine, complete with reversing gearbox, exhaust manifolds, etc, to make a marine powerplant of 1700 max emergency shaft horsepower, and which burns 100-octane gasoline.

The R. M. 60 marine gas turbine, shown in the accompanying illustration, is an entirely separate venture. It burns gas oil and, although designed for 6000 hp, it is being put into service for experimental purposes at 5400 hp, because of enforced curtailment of the development running. This engine weighs 13.5 long tons.

To persons who know the details, it is fairly obvious that the description you printed consists of a mixture of data concerning two entirely different projects but, to the uninitiated, your remarks are liable to

GRINETICS

By D G SMITH

Republication rights reserved.

"J&L 1200"

COLD FINISHED CARBON STEEL

It's tops

"J&L 1200" Steel provides the qualities that help machine operators do top-flight work at lower overall costs. With "J&L 1200," the operator obtains: *better machine finishes . . . longer tool life . . . higher rates of speed.* This fact has been proven time and again—in shop after shop.

"J&L 1200" grades meet the compositions published by the A.I.S.I. . . . S.A.E. . . . and Federal Specifications QQS-633.

Try this steel in your own shop. Results will convince you "J&L 1200" deserves to be a regular specification for your production runs.

Use J&L 1200 steel on your tough jobs for . . .

tops in quality

tops in machinability

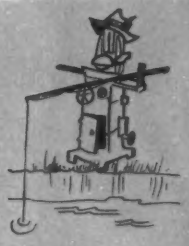
tops in uniformity

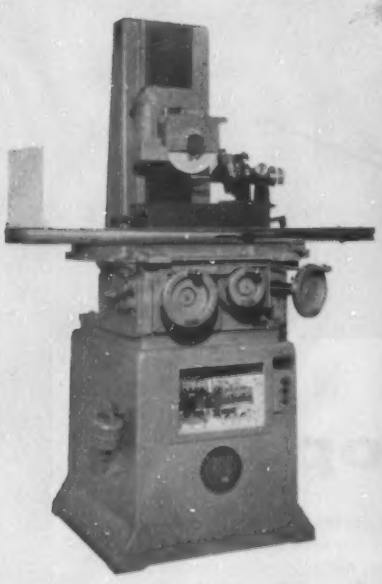
tops in finish

J&L STEEL

Jones & Laughlin STEEL CORPORATION — Pittsburgh

"How about a RETIREMENT PLAN for OVER-AGE Grinders?"





PLAN NOW FOR REPLACEMENT with REID GRINDERS

For the complete story on Reid Surface Grinders please write for Bulletin 618-1.

Reid Brothers Company, Inc.

lead to considerable confusion of thought. For the sake of accuracy, I hope you will bring this correction to the attention of your readers.

A Holmes Fletcher
Chief Designer, Marine Div.
Rolls-Royce Ltd
Derby, England.

We apologize for the error, but printed the description exactly as it came to us from the news service.—Ed.

Sapolio

Your note about using Sapolio in piston "run-in" and other places, (*AM*—Oct 11 '54, p185) brings to mind several visits to the early automobile shops, long before we ground cylinders, and before honing was common practice. My first contact was in Reading, Pa. in the shop of the Acme Automobile Co, building a high-grade four-cylinder car.

It was common practice then to "run-in" pistons in the cylinder block, using a fine grade of emery. I noticed that the abrasive being used was almost white and picked up a can to see what it was. It was Sapolio. The super asked me not to mention what they were using, as they had found it very satisfactory and he did not want competitors to know about it. So, of course, I forgot to mention the name in describing the making of Acme engines.

Not long afterwards I was in Indianapolis in the shop of the American Auto Co. Here, too, I found they were using Sapolio and trying to keep it from other car makers.

Years later I found the real information about it in a little shop near the Indianapolis Speedway which specialized in overhauling and tuning up cars for the big race. The owner made no secret of using Sapolio, not only in cylinders for lapping in the rings, but also in the bearings themselves. He had studied the action of Sapolio very carefully and

assured me that it had the great advantage of losing its abrasive quality after a few minutes between bearing surfaces. He went so far as to say that it did no harm to leave it in the bearings, although he usually washed it out with oil.

This recalls a visit to the Rolls-Royce shop in Springfield, Mass, soon after World War I. Needless to say the workmanship was excellent. The superintendent, who came to this country again during World War II to assist in the manufacture of Rolls-Royce airplane engines, was very friendly. When we came to the assembly line where crankshafts were being put in their bearings, I noticed the absence of scrapers, which were at that time largely used in our own shops. I always recalled his remark—

"After we machine a perfectly good bearing we don't want men digging holes in it with a scraper."

Before leaving the plant he remarked—"I probably should not tell you this. But many of our good practices we have learned from the American Machinist." We became good friends and, before we entered the last war, he gave me much valuable information on the Rolls-Royce airplane engine for the book I was writing at the time.

Fred H Colvin
Point Pleasant, NJ

Next to Godliness

Browsing through the pages of *AM*, I came across an item, "Learn to Wash." (*AM*—Aug 16 '54, p157) It reminded me of the time I drew down my spending money at the National Cash Register Co, Dayton. All we had to do, twice a week, was to go to the shop clerk and ask for a bath permit which would entitle us to a towel, soap, and washrag. We would swirl around to our hearts' content, and soak on company time. Rest assured we were pretty well waterlogged after we came out of the tub. I never worked in a place where we had such clean workers.

John Homewood
Burbank, Calif

THE *Complete Line*

GORHAM

END MILLS AND MILLING CUTTERS

For profitable solutions to production milling problems, call on Gorham! Over thirty years' experience in creating fine cutting tools is your assurance of satisfaction.

An extensive line of *standard* end mills and milling cutters is stocked by Gorham distributors. When you need *special* tooling, a Gorham Field Engineer surveys your problem and makes design recommendations for a tool to be "tailor-made" for your application by skilled Gorham craftsmen.

Ask your distributor for Gorham "standards." For "specials," call in your nearby Gorham Field Engineer. They're both well qualified to help you . . . and backed by unmatched experience and facilities. For profitable solutions to milling problems, call on Gorham! There's no obligation.

Write for free 120 page catalog. Shows entire line, contains valuable engineering information.

Gorham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

14408 WOODROW WILSON • DETROIT 3, MICHIGAN

WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne, Calif.

If you want to sell more to metalworking production
these familiar words
will help you find your most
productive advertising medium

a friend to

put the power of Metalworking's great sales builder . . .

ABP ABC

everybody is a friend to nobody

In the huge and diverse Metalworking Industry, it is *just* as logical that a magazine which tries to serve everybody's interests will serve no one's very well. Far better, as the wise author of an age-old proverb would surely agree, to *concentrate* on reaching fully, and serving completely, *one* important functional group in this $95-billion industry.

This is what *American Machinist* does, with results that surely prove the wisdom of such a course. This magazine concentrates all of its useful, searching pages on helping *metalworking production* to do a better job . . . and in doing so attracts the largest, most influential subscriber audience in the history of metalworking magazines: over 34,000 production-responsible engineers and executives who buy this magazine for the facts and help nowhere else available to them.

You'd hardly expect the results, advertising-wise, to be any different than they are. Over 950 manufacturers of products used and bought by metalworking production concentrate far more advertising pages, and far more advertising dollars, in *American Machinist* than in any other metalworking publication. And if *you* want the decisive voice of Metalworking's most important buying group behind your products, there really isn't any question where your advertising will best find the thoughtful, friendly attention of this industry's production leaders. You'll find it in *American Machinist* . . . and once you've experienced this magazine's ability to reach and influence metalworking production, you'll always want it in the No. 1 place on your advertising schedule.

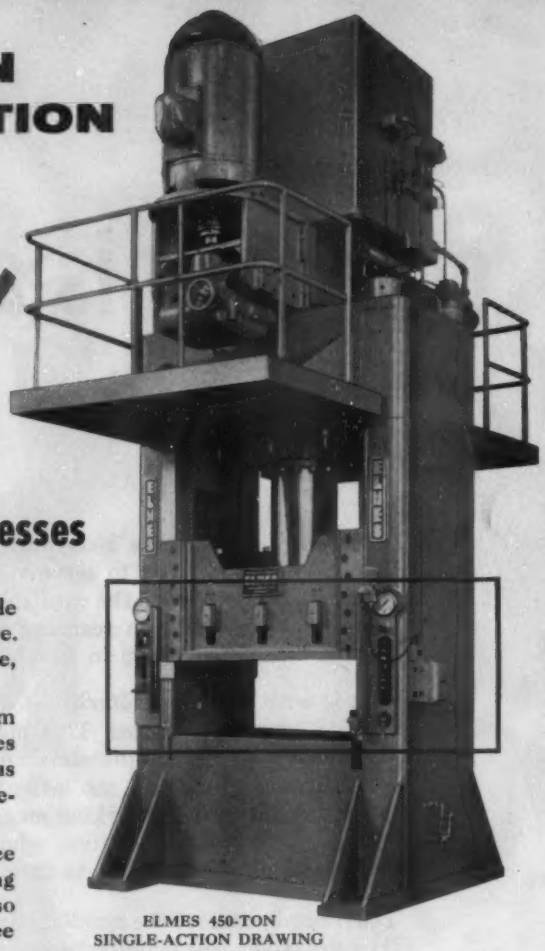
. . . *behind your products*

THE McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION
McGRAW-HILL BUILDING, NEW YORK 36
PUBLISHED EVERY OTHER MONDAY
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS
AND ASSOCIATED BUSINESS PUBLICATIONS

EASIER OPERATION
FASTER PRODUCTION

..are under your thumb!

with the sensitive, floor-level *Control System* on ELMES Presses

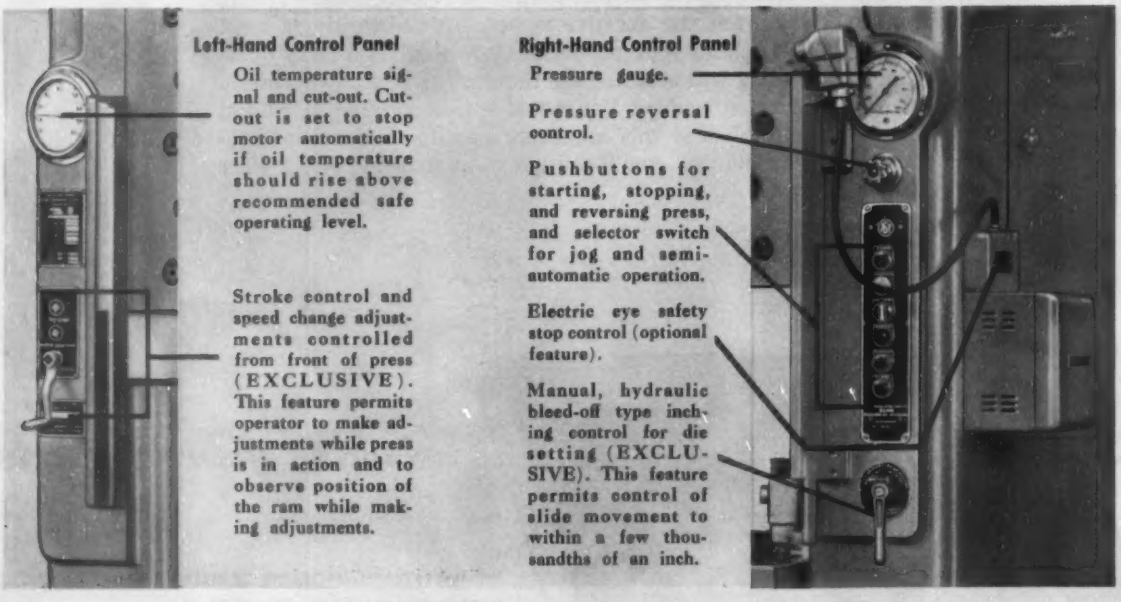


ELMES 450-TON
SINGLE-ACTION DRAWING
AND FORMING PRESS

Elmes simplified controls—all at floor level—have made hydraulic press operation fast, accurate, instantly responsive. Operators of Elmes® Presses have *confidence* in the precise, unfailing control at their command.

Illustrated and described below is the Elmes control system for single-action presses. (Note especially those features which are *exclusively* Elmes.) These same controls, plus additional control features, are provided on Elmes double-action presses.

Elmes engineers have the long and specialized experience that is all-essential for helping you solve your metal-pressing problems to the *best* advantage. And they're ready to do so at all times. For recommendations and cost estimates, see your Elmes Distributor, or write to us direct.



Left-Hand Control Panel

Oil temperature signal and cut-out. Cut-out is set to stop motor automatically if oil temperature should rise above recommended safe operating level.

Stroke control and speed change adjustments controlled from front of press (EXCLUSIVE). This feature permits operator to make adjustments while press is in action and to observe position of the ram while making adjustments.

Right-Hand Control Panel

Pressure gauge.

Pressure reversal control.

Pushbuttons for starting, stopping, and reversing press, and selector switch for jog and semi-automatic operation.

Electric eye safety stop control (optional feature).

Manual, hydraulic bleed-off type inching control for die setting (EXCLUSIVE). This feature permits control of slide movement to within a few thousandths of an inch.

ELMES

AMERICAN STEEL FOUNDRIES • ELMES ENGINEERING DIVISION
1161 Tennessee Avenue...Cincinnati 29, Ohio

HYDRAULIC PRESSES & EQUIPMENT

METAL-WORKING PRESSES • PLASTICS MOLDING PRESSES • PUMPS • ACCUMULATORS

Spot News of Metalworking...

- **RESERVE MACHINE TOOLS ...**
  Air Force will spend $84 million, Navy $12 million and Army $4 million on elephant machine tools in next few months, White House having given its blessing to final placing of $100 million authorized by Congress for reserve machine tools in fiscal 1955 military budget. For details, please turn to page 103.

- **1955 MACHINE TOOL SHOW ...**
  First Machine Tool Show in eight years will be held in International Amphitheater at Chicago September 6-17, 1955, and will be sponsored by National Machine Tool Builders' Association. It will be limited to US machine tools in 428,000 sq ft of floor area. In conjunction with it will be Production Engineering Show at Navy Pier exhibiting corollary equipment and instruments. Detailed story on page 162.

- **5-YEAR-AMORTIZATION FOR PLANEMAKERS?**
  Pentagon is likely to turn thumbs down on proposal by Roy Hurley of Curtiss-Wright that five-year tax amortization be granted as a cost allowance for modernization of aircraft engine production facilities. Mr Hurley contends that engine builders are loaded down with obsolete machines that boost production costs. Example: By spending $400,000 on new machines, Curtiss-Wright could reduce cost of one turbojet engine component from $28 to $11.

- **AUTOMATED CRANKPIN GRINDER ...**
  First of Norton's new crankpin grinders is almost ready for shipment to Utica, Mich, plant of Studebaker-Packard. The machine picks up crankshaft from conveyor, grinds all crankpins in four stations, returns piece to conveyor. Estimated production rate: 1 piece per hour.

- **MILITARY CONTRACTS ...**
  Army awarded $300 million contracts in October, the Navy $700 million — the latter was Navy's largest dollar volume for any month since January 1953.

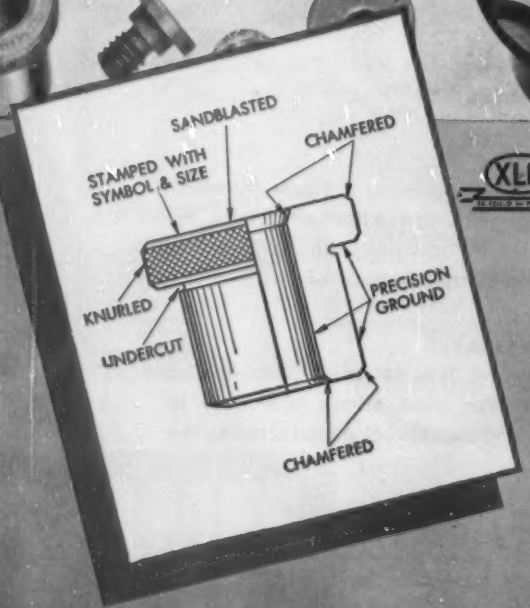
- **OPERATIONS ANALYZER ...**
  Now on the market is a robot test unit that allows engineers to figure the effect that new equipment will have on a given installation without actually installing the equipment. The electronic tester automatically charts behavior characteristics of a component and its effect on overall operations.

- **US-OWNED ORDNANCE INVENTIONS AVAILABLE ...**
  Ordnance, a newly issued government publication, lists 644 government-owned patented inventions in the Ordnance field. The publication's objective: to make them available to any firm interested in and capable of) manufacturing the listed items for military procurement.

Look for These Features in Drill Bushings

EX-CELL-O HAS THEM ALL

- **MATERIAL**—High chrome and carbon oil-hardening steel for maximum wear.
- **FINISH**—precision ground inside and out, and under the head for perfect bearing.
- **CONCENTRICITY**—assured by grinding on arbors after the holes are finished.
- **HARDNESS**—Deep-hardened to 62-64 Rockwell "C" in automatic equipment.
- **UNIFORMITY**—of material, dimensions, finish, and hardness assure accuracy, long life for both bushings and tools.
- **PROMPT DELIVERY**—from stocks of standard sizes in Detroit, New York, Los Angeles, and London, Canada.
- **PREFERRED**—largest bushing users in the country are Ex-Cell-O customers.



Your purchasing and engineering departments should have copies of this Ex-Cell-O Bushing Catalog No. 35936. Just ask for the number of copies you would like.

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES
CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS
AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Washington . . .

As of now, you can't expect a big upturn in defense spending because of the elections. Nor can you look for a general round of inflationary spending by the administration as a result of Democratic triumphs.

There'll be much political jockeying on the defense angle. Some Democrats campaigned on the issue that Eisenhower defense slashes hurt national security. Missouri's Sen. Symington, a persistent critic of administration military spending policy, and a potential Presidential nominee for 1956, has predicted the new Congress will boost military appropriations. He may get support from Sen Richard Russell, the new Armed Services Committee chairman, and House Speaker Rayburn. But despite Democratic politicking, there's doubt that their slim majority will be able to offset administration policy on this.

• • •

On Federal spending in general, the administration doesn't consider the election returns a repudiation of its economic policies. Besides, it's sure a business turnup is already underway. So it sees no reason to get behind an inflationary spending drive—even if it was disposed to start one for political reasons, which it isn't.

Here's how other issues shape up after the election: on foreign trade, the new lineup in Congress will mean a friendlier reception for Randall Commission's freer-trade proposals.

It's a good bet that no major labor legislation will be passed. If the White House offers it, the Democrats will probably back new minimum-wage legislation. Budget Bureau is now reviewing a plan to hike the present 75¢ rate to 90¢ or $1. It may be included in Eisenhower's recommendation to the 84th Congress.

Despite Democratic control of the two houses, there aren't enough labor-supporting lawmakers to back the labor's drive for sweeping changes in Taft-Hartley and for higher unemployment payments. The President may ask minor changes in these fields, but a White House program would face tough sledding. The unions won't be happy with its moderate proposals. And a combination of conservative Republicans and Southern Democrats will be fighting the program from the other side. There'll be a lot of pulling and tugging, but no action.

• • •

Taxes too may be a cause for controversy. Rayburn has warned that Democrats want to review some of the provisions in this year's new tax law. One idea is to wipe out special treatment for dividend income. But some politicos think an all-out attack on Republican tax policy may be deferred until 1956. The next election year is viewed by some as a more appropriate time for a Democratic campaign to revamp taxes.

Where's business going? The administration sees a general business level in 1955 at least as good as this year, maybe better. This outlook was revealed in broad designs at Washington's recent annual Farm Outlook Conference. It's the basis of tax and budget decisions now being worked up for the January Presidential messages to Congress.

Key to administration thinking about 1955 is consumer spending. Two big factors on the demand side—government and private investment in new plant and equipment—are expected to slide off next year from 1954 levels. But gains are anticipated in construction, foreign investment, and investment in inventories.

Now take a look at consumers. They're spending a little more of their income now than last year. At an annual rate, it's estimated that there's a shift of just under $2 billion from savings into the spending stream. What's more, personal income keeps rising.

Administration experts also forecast a jump in Gross National Product, from the present $356 billion to $370 billion or a little better. Industrial production, constant most of this year at around 124 on the FRB Index, will likely show a smaller gain, maybe to around 128.

• • •

Labor Secretary Mitchell wants to make up with union officials with whom he traded bitter words during the election campaign. Appointment of an advisory committee of labor leaders—including AFL and CIO men from auto and machinists unions—is a step in this direction. But though union officials will be consulting with Mitchell on departmental labor policies, they won't have much to say on new White House labor law proposals.

• • •

ODM has named some 50 industry executives for its new "Executive Reserve." They will be pioneers in what ODM hopes will become the government's counterpart to the Organized Military Reserve. The businessmen are getting specific jobs — extra positions ODM thinks would have to be filled in wartime, high-level policy posts dealing with production controls, raw material allocations, price and wage controls, manpower, and the like. They'll be in Washington just a couple of days a year to keep their hand in activities. ODM figures an emergency need for about 200 businessmen—reservists to augment its own staff on 100-ODD civil service professionals. So far, production planning slots are filled by telephone system men for the most part. Idea is for other agencies to do the same.

How Much Automation for You?

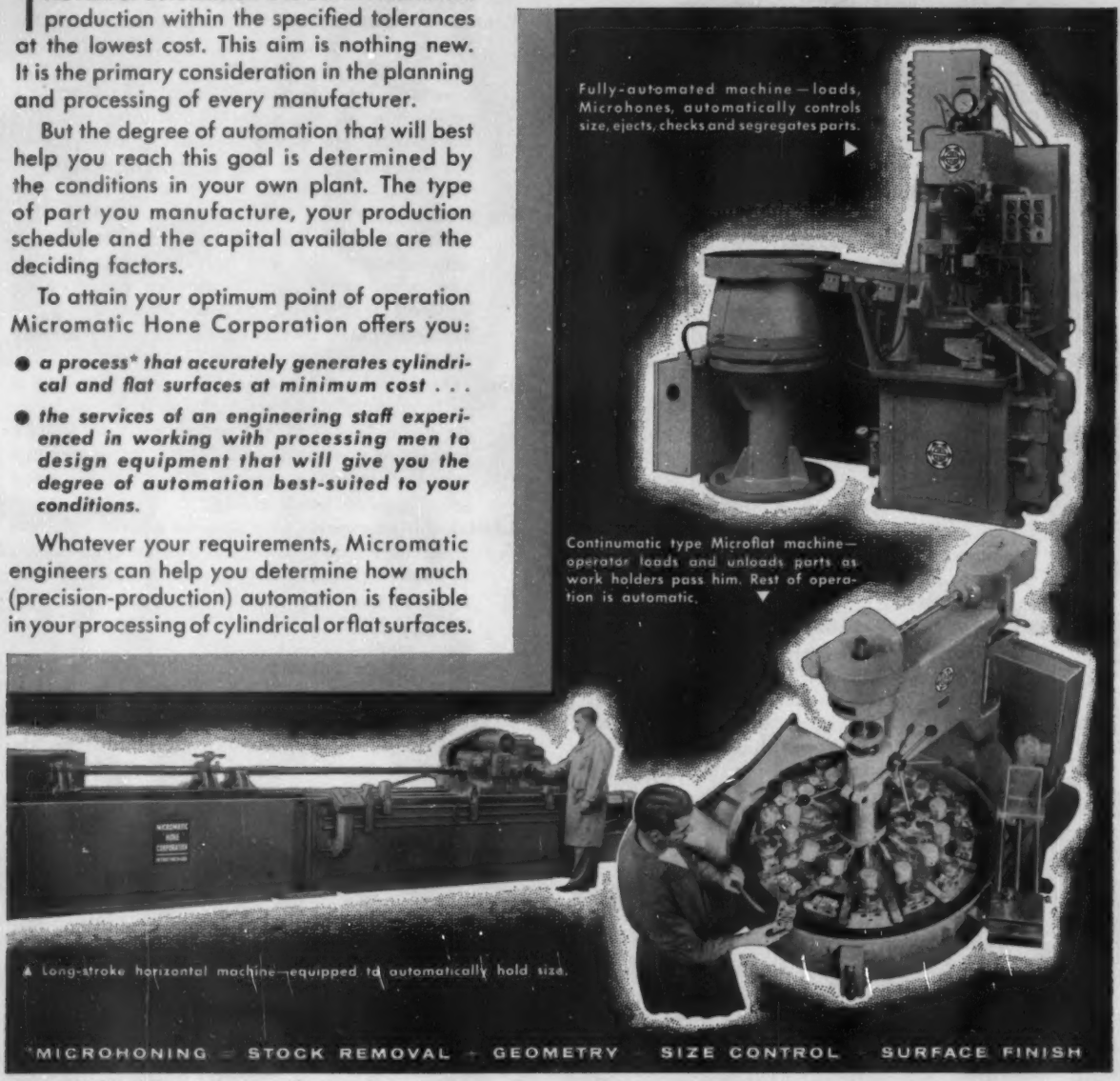
THE AIM of automation is to obtain maximum production within the specified tolerances at the lowest cost. This aim is nothing new. It is the primary consideration in the planning and processing of every manufacturer.

But the degree of automation that will best help you reach this goal is determined by the conditions in your own plant. The type of part you manufacture, your production schedule and the capital available are the deciding factors.

To attain your optimum point of operation Micromatic Hone Corporation offers you:

- ***a process* that accurately generates cylindrical and flat surfaces at minimum cost . . .***
- ***the services of an engineering staff experienced in working with processing men to design equipment that will give you the degree of automation best-suited to your conditions.***

Whatever your requirements, Micromatic engineers can help you determine how much (precision-production) automation is feasible in your processing of cylindrical or flat surfaces.



Fully-automated machine—loads, Microhones, automatically controls size, ejects, checks and segregates parts. ▶

Continumatic type Microflat machine—operator loads and unloads parts as work holders pass him. Rest of operation is automatic. ▼

▲ Long-stroke horizontal machine—equipped to automatically hold size.

*MICROHONING = STOCK REMOVAL + GEOMETRY + SIZE CONTROL + SURFACE FINISH

For more information write for general catalog and CROSS-HATCH Vol. 6

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVE., DETROIT 38, MICHIGAN

1929 • 1954 — 25TH YEAR OF DEVELOPMENT — PRECISION PRODUCTION THROUGH MICROHONING — MICRO MATIC TRADE MARK

MICROMATIC HONE CORP.
MICRO-MOLD MFG. DIV.
Boston Post Road
Guilford, Connecticut

MICROMATIC HONE CORP
2205 Lee Street
Evanston, Illinois

MICROMATIC HONE CORP.
1535 Grande Vista Avenue
Los Angeles 23, California

MICROMATIC HONE LTD.
330 Grand River Avenue
Brantford, Ontario, Canada

MICROMATIC HONE CORP.
MICRO-MOLD MFG. DIV.
231 So. Pendleton Avenue
Pendleton, Indiana

REPRESENTATIVES: Allied Northwest Machine Tool Corp., 103 S.W. Front Ave., Portland 4, Oregon • Mason Machine Tool Company, 415 So. Second East, Salt Lake City, Utah • Tidewater Supply Co., Charlotte 4, North Carolina
Perine Machinery & Supply Co., 1921 First Ave., South, Seattle 4, Washington

REPRESENTATIVES IN ALL PRINCIPAL COUNTRIES

SUBSIDIARY:

Micro-Precision Inc., 2205 Lee Street, Evanston, Illinois

Hydraulic Controls • Diesel fuel injection equipment

Detroit . . .

As this was written, CIO's United Auto Workers' Union was flexing its muscles, relishing Michigan election results and setting strategy for its new contract assault on auto makers this spring.

CIO and UAW President Walter Reuther wrote to automakers recently, warning them that the union looks with disfavor on "recruitment of new workers . . . to support levels of production that are not intended to be maintained . . ." for 12 months of the year, and asked auto managements to level out production schedules.

A letter addressed to the Republican State Central Committee and signed by five UAW regional directors reiterated that position: ". . . comparison of the production schedules of the automobile corporations for the months immediately ahead with their projections of total output for 1955 clearly points to unemployment in the second half of next year even more serious than our state has experienced this year."

An accompanying UAW news release said, ". . . the GOP will have a chance to prove that the GOP learned a lesson on election day by supporting improvements in Michigan's Unemployment Compensation Law . . ."

All this by way of adding pressure to the campaign for GAW—the Guaranteed Annual Wage.

• • •

There is no doubt but what early production schedules of 1955 cars are high, as they always are, going into a new model run. Industry programming for November and December indicates production of slightly over half-a-million cars in each month. That out of a projected total output by the industry in 1955 of about 5.5-million cars.

There is plenty to be said for industry's attitude in the matter of production schedules, as well as the viewpoint of the assembly line worker, who generally must look forward to layoff sometime during the latter half of the year.

Major bulk orders from dealers come at the beginning of a model run, of course, when the public's curiosity about new models is sharpest. Neither dealers nor factories nor workers can afford empty showrooms at precisely the time when showroom traffic is heaviest.

A classic example of that was Studebaker's experience two years ago. Its then-startling styling had won for it one of the greatest publicity breaks in auto history. But production problems held output to a trickle for weeks, and unknown numbers of motorists who had a notion to buy a Studebaker couldn't get delivery. How many sales Studebaker lost because of inability to stock dealerships could not be determined, but significantly, the company has been in trouble ever since (although it is now claiming wide acceptance of it's '55 models).

Another factor which appears to justify current high production is this: dealer stocks going into the '55 model year have been abnormally low. Many a dealership in the Detroit area has been virtually barren of cars for several days or weeks during model changeover.

• • •

Very low inventories have provoked an unusual display of new cars. Generally, great secrecy prevails prior to public introduction of a new model. No pictures are prematurely released. Cars leaving factories are covered or partially disguised. Dealers keep their new models out of sight. All these precautions are taken simply to protect dealers who are still trying to get rid of last year's models.

This year around Detroit, the public has been able to view nearly all 1955 models well in advance of public introduction. Chrysler Corp cars, Buick, Olds, Ford and others have been on the streets, or visible in showrooms, for at least several days before introduction. Reason: most dealers had no troublesome stocks of '54's on hand.

• • •

UAW likely will have little success in convincing automakers that they should spread production evenly over the full 12 months, any more than UAW can convince the public that it should buy at an even rate over the 12 months.

Just how UAW plans to try to make industry see things the union way were to be determined in large part during UAW's National Economic and Collective Bargaining Conference in Detroit on Nov 12-13.

There, about 1000 delegates from local unions were to thrash out UAW's final approach to the industry in the matter of new contracts. Aside from GAW, the union was to discuss such other matters as cost-of-living escalators, the annual improvement factor, insurance, etc. The final approach will be put into concrete form during UAW's convention next spring.

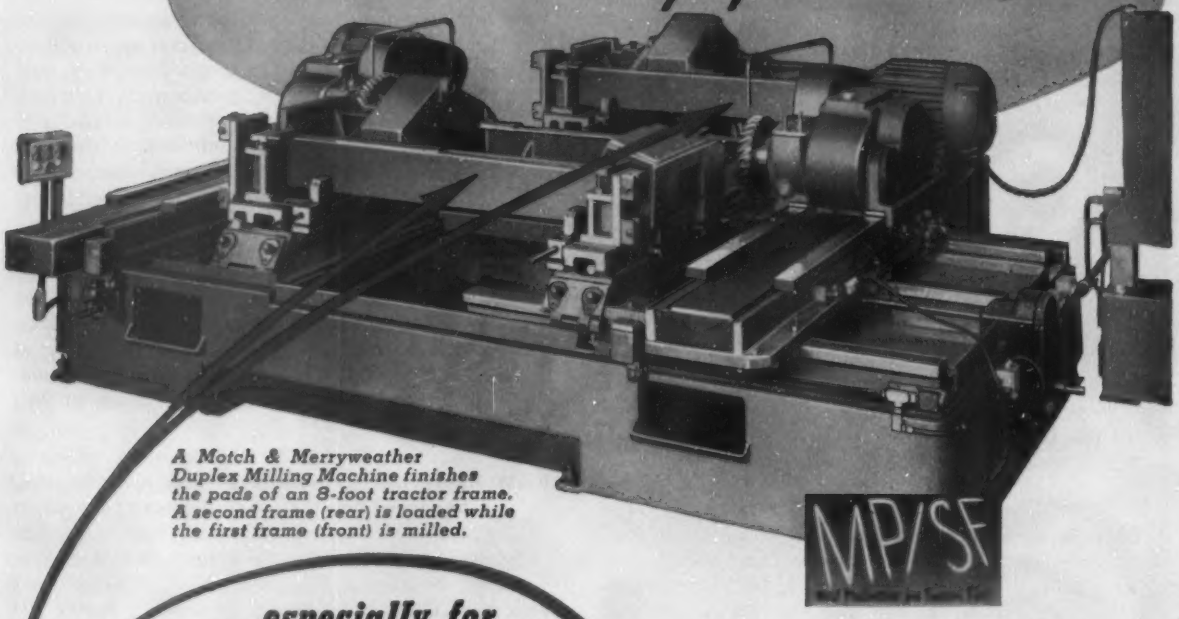
As of now, chances of a peaceful settlement between UAW and the auto company on which it makes initial GAW demands appear slight. On- and off-the-record, auto executives have been completely antagonistic, saying they could not or would not entertain demands for annual wages. A compromise is not entirely impossible, since Reuther's objective in past negotiations involving major changes sometimes has been to get the principle first, then go after the large money later. He may be satisfied to get only a foot in the door in 1955, then get inside for the real package a year or two later.

Another Duplex Milling Machine

BY MOTCH & MERRYWEATHER

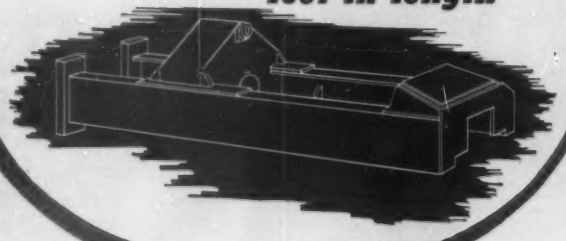
Fifty Years 1904 - 1954

STANDARDIZED TRAVELING HEAD DESIGN is adapted to *Many Specialized Jobs*



A Motch & Merryweather Duplex Milling Machine finishes the pads of an 8-foot tractor frame. A second frame (rear) is loaded while the first frame (front) is milled.

... especially for Large Parts 6 feet to 11 feet in length



Again using the facility of *traveling milling heads* instead of traveling fixtures, Motch & Merryweather creates greater universality, saves time, original cost and floor space. Standardized design enables duplex operation to dispatch a wide range of work with money-making speed and accuracy. Simplified fixturing is readily adjustable to handle parts of varying size. May we study your requirements?

THE MOTCH & MERRYWEATHER MACHINERY CO.

MACHINERY MANUFACTURING DIVISION

CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, also Production Milling, Turning, and Special Machines

Machine Tools . . .

The White House has given its official blessing to the spending of $100 million by the armed services for reserve machine tools under the Vance Plan.

Whats more, all the money is to be paid out for machine tools and nothing else. The funds, recently appropriated by Congress, are not to be dissipated for other purposes.

The President actually has reviewed the proposed expenditures and indicated his approval.

• • •

The Air Force will place orders for $84 million, leaving only $16 million for the other services.

The Navy is reported to be preparing to spend $12 million, and the Army $4 million.

Air Force buying will be for machines tied in to production of the F-100 Super-Sabre, the Delta-Wing F-102 fighter, the Delta-Wing supersonic B-58 bomber, the B-66 light bomber, and the new Curtiss-Wright and Pratt & Whitney jet engines.

Various kinds of presses, skin-millers, large boring mills, slab-type planers and milling machines are among the types of machines to be ordered.

No grinding machines are said to be on the list.

Roger Lewis, assistant secretary of the Air Force, will be in charge of the reserve machine tool buying program.

At least six weeks will be necessary to work out the technical details of the program.

This means that the actual placing of orders will not begin until sometime after January 1.

One thing is sure, however—the money will be spent in the current fiscal year.

• • •

Air Force authorities are said to be dead set against storing the reserve machine tools, when completed, in aircraft manufacturing plants.

Unless present plans are changed, the program that the Air Force would like to work out calls for storage of at least some of the machines in machine tool building areas.

One plan being seriously considered is to ask a machine tool builder in each area to invest his own money in erecting a warehouse for storage of machines.

He then would be paid for rental and maintenance.

At least one important builder has indicated that he would go along with this plan if the Air Force should adopt it.

• • •

The Navy's $12 million will go for reserve tooling to produce turbines, projectiles and fuses. A 200-in. gear hobbing machine for the marine reduction gear plant at Lynn, Mass, will be included.

The Army will spend its $4 million allotment for machines to make medium tank engines and fire control equipment.

As part of a plan for making the production and storage of reserve machines practical and subject to the least possible hazard from obsolescence, a series of meetings has been held in Washington and elsewhere in which interested machine tool builders have participated.

The purpose has been to arrive at an agreement upon standardization of certain features of machines so that the same aviation parts can be machined on similar machines.

The Aircraft Industries Association pushed the idea in the beginning. The Air Force and Navy Bureau of Air got behind it too. Then the Business and Defense Services Administration took hold and arranged for task forces of builders, such as skin-miller manufacturers, to meet.

These group meetings, which have been very successful, have been taking place through the summer and fall right up to now.

• • •

Armed services are reported to be planning to spend up to $300 million for procurement of machine tools, over and beyond the $100 million reserve program, in the current fiscal year.

The services have the money to carry through with this plan, which has the approval of Secretary Wilson and of the White House.

Only drawback is likely to be the difficulty of the various services in crystallizing their military goods requirements to the point that production tooling could be ordered.

In viewing the ordering of machine tools to be done by the armed services for reserve purposes and for active programs, one is safe in saying that the total to be placed in 1955 will be somewhere between $150 million as a minimum and $400 million as an outside top figure.

• • •

Imports of metal cutting, forming and shaping machines ran to $12 million the first half of this year. That was well behind the imports of $20 million in the same period of 1953 and far down from the $37 million in second half of last year.

Exports of metal-cutting machines were $40 million in first six months of 1954, down sharply from $69 million in the like period of 1953.

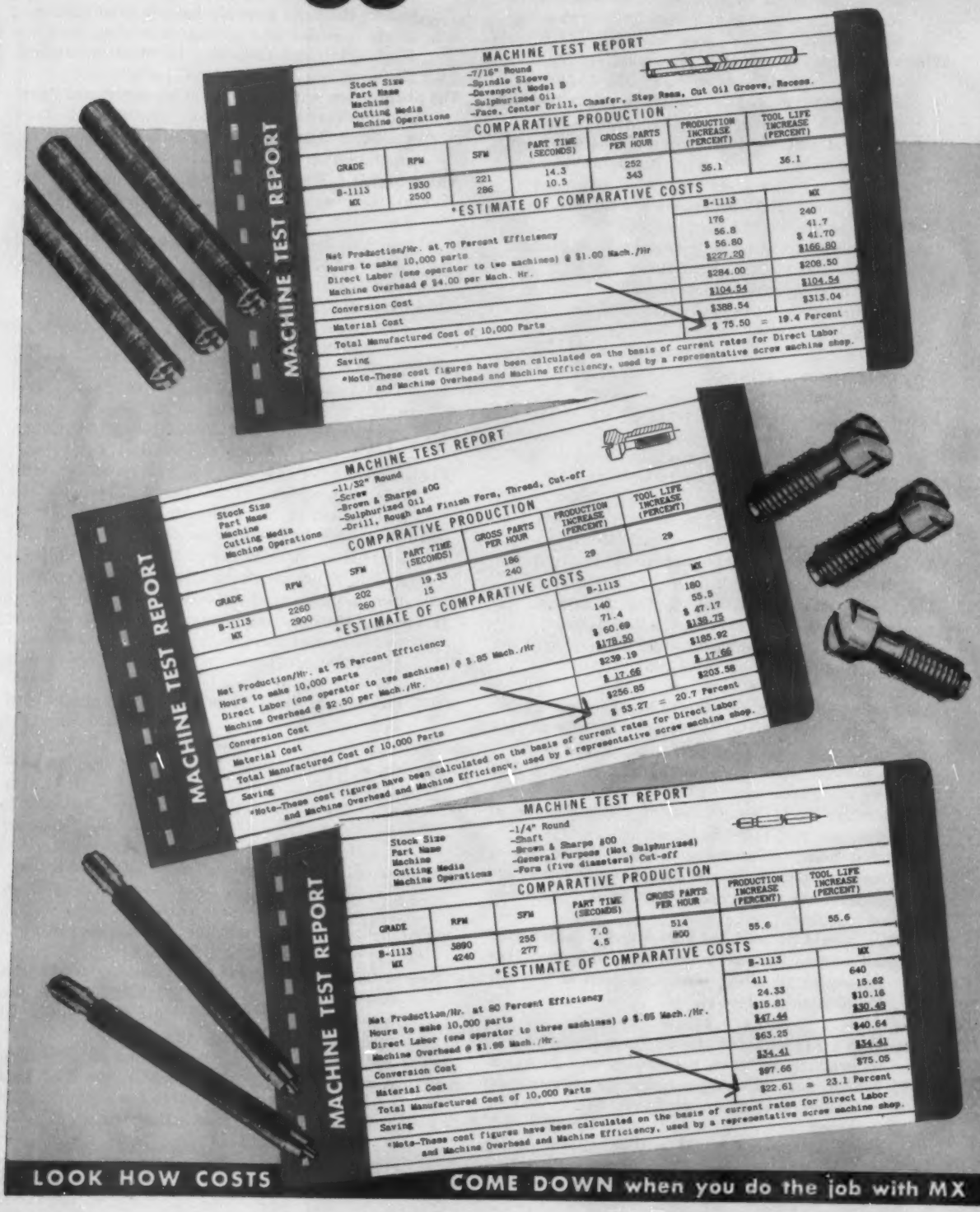
Forming and shaping machine exports stayed on a par with last year, at $20 million.

New orders for all kinds of metalworking production machinery amounted to $348 million in the first half, a drop of 41% from $594 million in the same period last year.

First half shipments this year reached $631 million, compared with $739 million in the first half of 1953. All of these figures are from BDSA's Metalworking Equipment Division.

BF

Get bigger dividends


MACHINE TEST REPORT
Stock Size -7/16" Round
Part Name -Spindle Sleeve
Machine -Davenport Model B
Cutting Media -Sulphurized Oil
Machine Operations -Face, Center Drill, Chamfer, Step Ream, Cut Oil Groove, Recess.
COMPARATIVE PRODUCTION
GRADE | RPM | SFM | PART TIME (SECONDS) | GROSS PARTS PER HOUR | PRODUCTION INCREASE (PERCENT) | TOOL LIFE INCREASE (PERCENT)
B-1113 1930 221 14.3 252 36.1 36.1
MX 2500 286 10.5 343
*ESTIMATE OF COMPARATIVE COSTS
B-1113 MX
Net Production/Hr. at 70 Percent Efficiency 176 240
Hours to make 10,000 parts 56.8 41.7
Direct Labor (one operator to two machines) @ $1.00 Mach./Hr $ 56.80 $ 41.70
Machine Overhead @ $4.00 per Mach. Hr. $227.20 $166.80
Conversion Cost $284.00 $208.50
Material Cost $104.54 $104.54
Total Manufactured Cost of 10,000 Parts $388.54 $313.04
Saving $ 75.50 = 19.4 Percent
*Note-These cost figures have been calculated on the basis of current rates for Direct Labor and Machine Overhead and Machine Efficiency, used by a representative screw machine shop.
MACHINE TEST REPORT
Stock Size -11/32" Round
Part Name -Screw
Machine -Brown & Sharpe #0G
Cutting Media -Sulphurized Oil
Machine Operations -Drill, Rough and Finish Form, Thread, Cut-off
COMPARATIVE PRODUCTION
GRADE | RPM | SFM | PART TIME (SECONDS) | GROSS PARTS PER HOUR | PRODUCTION INCREASE (PERCENT) | TOOL LIFE INCREASE (PERCENT)
B-1113 2260 202 19.33 186 29 29
MX 2900 260 15 240
*ESTIMATE OF COMPARATIVE COSTS
B-1113 MX
Net Production/Hr. at 75 Percent Efficiency 140 180
Hours to make 10,000 parts 71.4 55.5
Direct Labor (one operator to two machines) @ $1.85 Mach./Hr $ 60.69 $ 47.17
Machine Overhead @ $2.50 per Mach./Hr. $178.50 $138.75
Conversion Cost $239.19 $185.92
Material Cost $ 17.66 $ 17.66
Total Manufactured Cost of 10,000 Parts $256.85 $203.58
Saving $ 53.27 = 20.7 Percent
*Note-These cost figures have been calculated on the basis of current rates for Direct Labor and Machine Overhead and Machine Efficiency, used by a representative screw machine shop.
MACHINE TEST REPORT
Stock Size -1/4" Round
Part Name -Shaft
Machine -Brown & Sharpe #00
Cutting Media -General Purpose (Not Sulphurized)
Machine Operations -Form (five diameters) Cut-off
COMPARATIVE PRODUCTION
GRADE | RPM | SFM | PART TIME (SECONDS) | GROSS PARTS PER HOUR | PRODUCTION INCREASE (PERCENT) | TOOL LIFE INCREASE (PERCENT)
B-1113 3890 255 7.0 514 55.6 55.6
MX 4240 277 4.5 800
*ESTIMATE OF COMPARATIVE COSTS
B-1113 MX
Net Production/Hr. at 80 Percent Efficiency 411 640
Hours to make 10,000 parts 24.33 15.62
Direct Labor (one operator to three machines) @ $1.85 Mach./Hr. $15.81 $10.16
Machine Overhead @ $1.95 Mach./Hr. $47.44 $30.45
Conversion Cost $63.25 $40.64
Material Cost $34.41 $34.41
Total Manufactured Cost of 10,000 Parts $97.66 $75.05
Saving $22.61 = 23.1 Percent
*Note-These cost figures have been calculated on the basis of current rates for Direct Labor and Machine Overhead and Machine Efficiency, used by a representative screw machine shop.
LOOK HOW COSTS
COME DOWN when you do the job with MX

from your screw stock

...do the job with MX

the freer-machining screw stock
available in both Bessemer and Open Hearth

USS MX FREE-MACHINING STEEL pays off in four ways—

MX lowers the cost per part by increasing the rate of production.

MX reduces down time and costly grinding by prolonging tool life.

MX often eliminates extra finishing operations by assuring better part finish.

MX helps to minimize rejection by providing closer dimensional accuracy.

These are facts proved in hundreds of shops that have used MX in more than a billion parts . . . parts of infinite variety turned out under dissimilar conditions and on screw machine equipment of many types.

USS MX Free-Machining Steel works *with* your tools—not against them. It is designed to ensure maximum cutting speeds compatible with economical tool life. As a result, production goes up and costs come down wherever fast-cutting MX is put to work.

From the many case histories we have on file, we feel that MX will cut the cost of *any* part you now machine from ordinary screw stock. You can prove this for yourself by giving MX a trial on your own machines.

And remember: Although USS MX Free-Machining Steel costs no more than ordinary screw stock, *it has been successfully machined at speeds approaching 350 SFM*—speeds far higher than the *average* speeds (under 250 SFM) used in most shops today.

So if you want lower material costs, a profitable rate of production, long tool life and good finish, your best bet is USS MX, either Bessemer or Open Hearth.

USS MX Free-Machining Steel is produced in all the popular screw stock sizes. It is sold in cold-finished form by your regular supplier either as "MX" or under his own identifying trade name. In hot-rolled form, MX is available through our nearest district sales office.

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

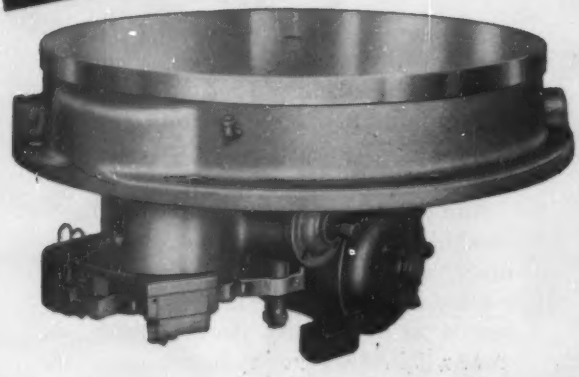
USS

UNITED STATES STEEL

automatic cam feed units

Avey has both...

automatic index tables



Automatic Index Tables

meet demand for Drilling and Tapping Equipment

Made in sizes 16", 20", 24", 30", 36" and 40" diameter. Indexes, 3 to 100 stations.

These Index Tables are self-contained units, built on unit construction principle and includes motor drive assemblies. All drive and control mechanisms underneath table for free work surface... easy accessibility.

Send for Bulletins

Automatic Cam Feed Units

for Drilling...Tapping...Reaming... Hollow Milling and Deep Hole Drilling

Vertical, Horizontal or Angular Mounting

Units are universal in application...let us show you their application to your job.

Made in two sizes—No. 1 and No. 2 Morse Taper.

This simple unit gives high production at a lower cost. When used in multiples to complete operations, no relocation of part is necessary, thus producing more accurate work.

Semi-skilled operators will deliver high production accurately and efficiently, yet with a minimum of supervision.

THE AVEY DRILLING MACHINE CO.

Cincinnati 1, Ohio

Avey

Gaging Metalworking . . .

PRODUCTION INDEX
BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	OCT '54(*)	SEPT '54(p)	AUG '54(r)	SEPT '53
Tot. Index...	**145**	**146**	**148**	**166**
Machinery	123	126	141	
Electrical Machinery	185	181	200	
Autos	83	97	110	
Other Transportation	302	290	316	
Other Metalworking	124	126	140	

(*) Estimated (p) preliminary (r) revised

Metalworking production is not making the headlines these days, but is keeping at a steady pace in an unspectacular way.

The fluctuation in operations has been in a very narrow range for months. The AMERICAN MACHINIST index has edged off a bit this fall, but not enough to have any damaging effects.

• • •

Automobile production, stimulated by necessity for stocking dealers with 1955 models, has given Metalworking a shot in the arm.

November and December assemblies will be close to record levels. The beneficial results of this activity will be felt in many segments of the metalworking industry.

Just one warning note is in order: Automobile makers don't intend to plunge recklessly. They are likely to feel their way after new models are out until public reaction, as expressed in actual sales, is clearly defined.

Meanwhile the automobile parts people, cheered by more liberal releases from Detroit, are not being stampeded into undue enthusiasm until the course ahead is more apparent.

• • •

Many indexes of machinery and supply orders have turned upward lately. They have not registered sensational gains, to be sure, but the fact is that they once again are pointing in the right direction.

The trend in so-called perishable items is to order more freely. This is understandable, because inventories in consumers' plants are relatively slim.

Farm implement makers confirm the mild but solid upturn in their business. Best of all, increased sales have necessitated a higher production rate.

• • •

The nation's steel production rate stands about 76% of capacity. But in Ohio's Cleveland area, the rate is about 10% higher. In some other parts of the state, it's creeping up above the national average.

Demand is strong for practically all steel items, including wire products.

Sheet and strip are Detroit-bound in such quantities that mills are promising only 6-8 weeks' delivery on those items.

This is making it tough on those firms whose inventories are nil, and who are buying on a hand-to-mouth basis.

But, steelmakers say, this argues well for a continuation of the present operating rate well into next year.

Also in top demand are all galvanized items, forging bar stock, industrial wire.

• • •

A slight August upturn is reported by the screw machine products industry to have continued well through September. And it looks like the improved level will remain at least through the first quarter of 1955.

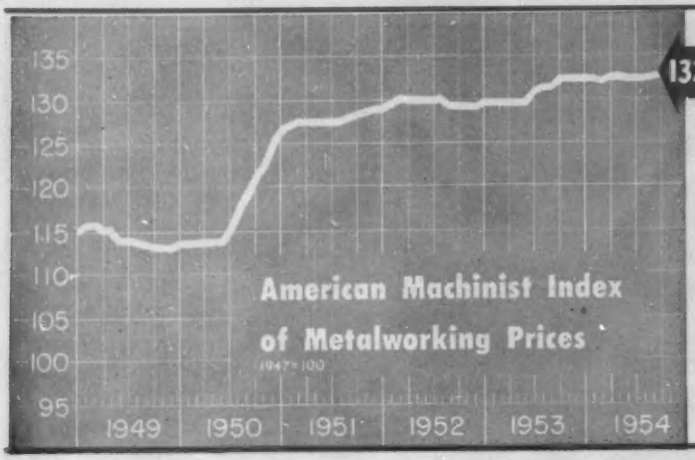
• • •

Parts orders from Detroit are somewhat spotty to date. For instance, one frame maker has upped its production 50% from early fall — so has a major body builder.

Bolt and nut makers, on the other hand, are disappointed in their Detroit orders.

Most part makers feel that the automakers are planning to feel their way after the new models come out — and that they won't plunge until public reaction is certified by orders.

Gaging Business . . .



PRICE INDEX

	OCT '54(*)	SEPT '54(p)	AUG '54(r)	SEPT '53
Total Index	**132.8**	**132.8**	**132.6**	**132.5**
Metalworking Machinery	**142.4**	**141.7**	**141.8**	
Other Machinery exc. Electrical	**137.5**	**137.4**	**137.0**	
Electrical Machinery	**130.9**	**130.9**	**131.4**	
Fabricated Metal Products	**129.2**	**129.1**	**129.0**	

(*) Estimated (p) preliminary (r) revised

Gross National Product is expected to make a sharp pickup in the fourth quarter.

The seasonally adjusted annual rate may be as much as $4 billion higher than the third-quarter rate. And most of this pickup is anticipated in the shift from an inventory decumulation to an inventory buildup.

If GNP totals $360 billion in the fourth quarter, it will be about $10 billion less than the all-time peak. And even this $10 billion can be accounted for by exactly that amount of drop in government spending.

• • •

Business will have spent $5 billion less than in the peak year, while the consumer will have offset this by spending about $5 billion more than he did.

Corporation profits, both before and after taxes, are expected to show a substantial drop when the third quarter figures are in.

But this year's final quarter is expected to see a recovery of profits to a high point for the year.

First-half profit average (seasonally adjusted to annual rates) was $34.5 billion before taxes, and $17.5 billion after taxes.

• • •

Factory employment rose slightly in October — contrary to the usual seasonal decline. The increase was small — only 17,000 workers.

Durable goods plants increased employment, but non-durable employment dropped off.

October's factory workweek was just under 40 hours — averaging 12 minutes longer than the previous month. However, it is two-fifths of an hour shorter than the corresponding workweek in October 1953.

• • •

Average hourly earnings of factory workers in October and September were the same — $1.81. This was 2¢ over the October 1953 rate.

Because of the longer workweek in October than in September, the average weekly earnings of factory workers increased to $72.22—the highest October on record.

WEEKLY BUSINESS INDICATORS

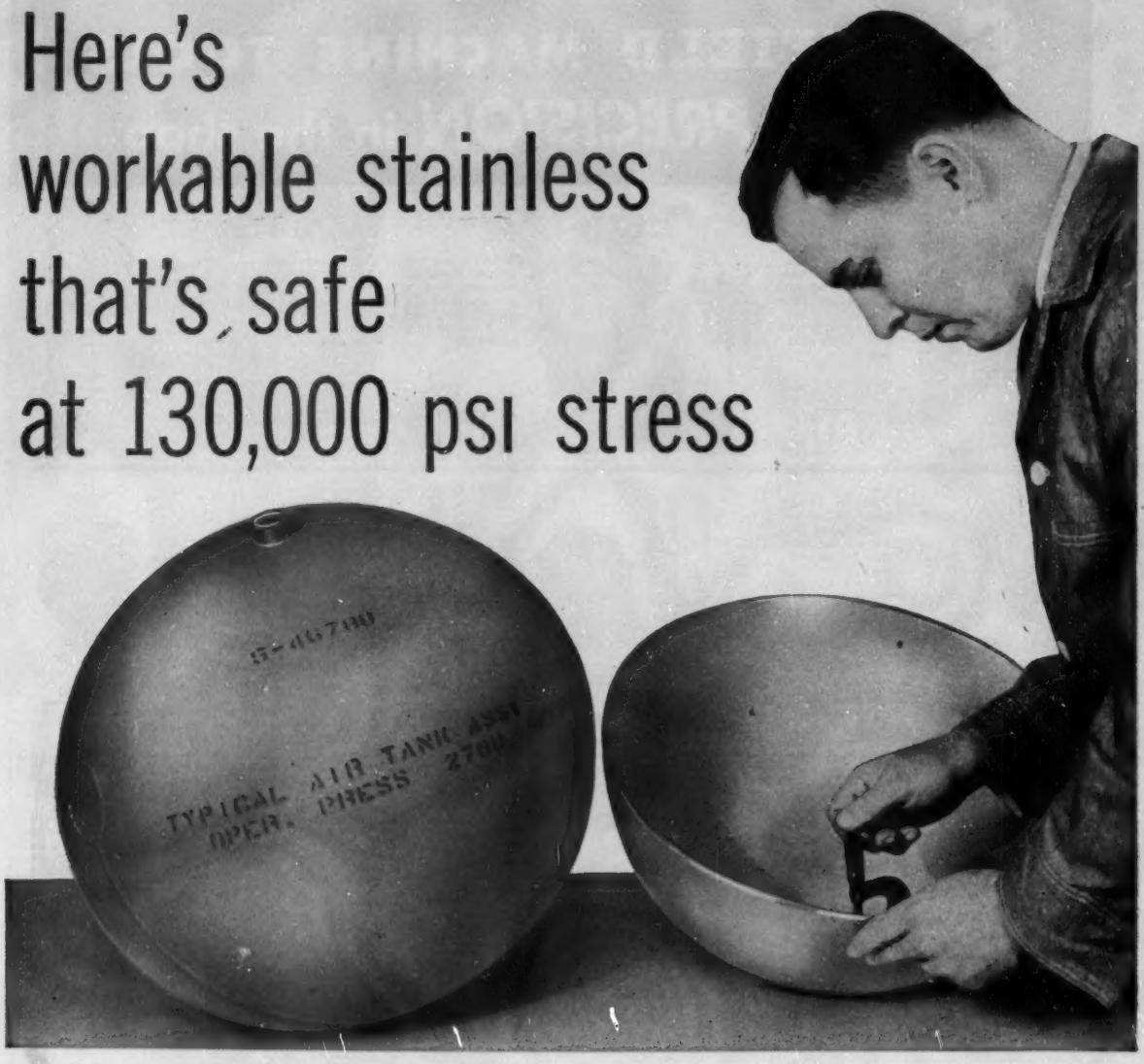
	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-1949 = 100)*	127.3	124.8	128.1
Steel ingot operations (thousands of tons)	1,842	1,822	2,081
Electric power output (million Kilowatt hours)	9,357	9,152	8,398
Production of automobiles and trucks	121,739	90,662	133,783
Engineering construction awards (*Eng. News-Record*—millions)	$371.5	$287.1	$251.7

QUARTERLY BUSINESS INDICATORS

	Latest Quarter	Preceding Quarter	Year Ago
Gross National Product (billions)	$ 356.0	$ 356.0	$ 367.2
Expenditures of new plant and equipment (millions)	$25.960	$26.750	$28.560
Profits after taxes in primary iron and steel industry (millions)	$ 185	$ 167	$ 243
Profits after taxes electrical machinery industry (millions)	$ 162	$ 173	$ 165
Profits after taxes machinery (except electrical—millions)	$ 253	$ 229	$ 278
Profits after taxes in motor vehicles and parts industry (millions)	$ 340	$ 291	$ 272
Motors and generators new orders index (1947-1949 = 100)	153.0	152.0	186.3

* Seasonally adjusted

Here's workable stainless that's safe at 130,000 psi stress



This stainless steel pressure vessel operates under an average stress of 130,000 psi . . . is tested at a calculated stress of 169,000 psi.

Of course, the shell is constructed of a special stainless steel—Armco 17-7 PH—a precipitation-hardening type made only by Armco. The two halves are readily drawn and welded while the steel is in the annealed condition. The finished assembly is then hardened by double precipitation-hardening heat treatment.

This is the procedure for hardening Armco 17-7 PH. It is first held at 1400 degrees F for 1½ hours, then cooled to 60 degrees F or lower. After that comes a second heat treatment at 950-1050 F for ½-hour and air cooling.

WELDS STRONG TOO

The result of this double heat treatment is a minimum yield strength of 150,000 psi and tensile strength of 180,000 psi or higher. Welds have this same strength when made by the inert-gas shielded-arc system.

If you need a stainless steel with easy workability, high strength, endurance and fatigue resistance, write for information on the Armco Precipitation-Hardening Stainless Steels. Besides Armco 17-7 PH there is the single heat treatment precipitation-hardening bar grade, Armco 17-4 PH.

ARMCO STEEL CORPORATION
4944 CURTIS STREET, MIDDLETOWN, OHIO

ARMCO®

[illegible] STEEL • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE [illegible] INTERNATIONAL CORPORATION

SHEFFIELD MACHINE TOOLS guard *PRECISION* in the shop

Micro-form Grinder, Model 121 grinds high precision profiles both flat and circular directly from large scale drawing, saving up to 75% over conventional practice.

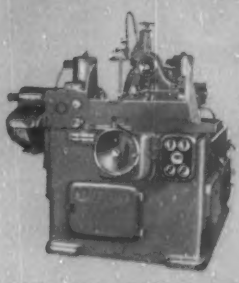
14

Micro-form Grinder, Model 122 equipped with a combination 30 power microscope and viewing screen.

15

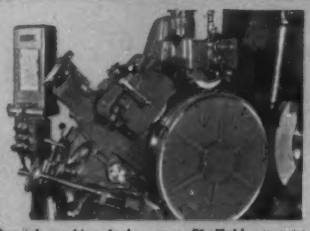
Thread and Form Grinder, Model 133 uses the multi-ribbed wheel principle to grind small precision threads and intricate forms on a high production basis.

16



Precision Thread and Form Grinders —100 Series, produce precision threaded elements and cylindrical forms by the Crushtrue method, the diamond dressed multi-ribbed wheel or the single point wheel method.

17



Special machine tools are a Sheffield specialty, such as this one of 12 jet turbine shroud grinders placed in operation within the last six months.

18

Idler and motorized type Crushtrue devices are available for forming grinding wheels on standard surface grinders.

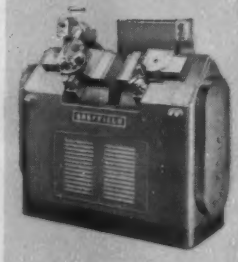
19

The Sonicut Cavitron, Sheffield's new Ultrasonic Machine Tool, machines the hardest metals and minerals known to man to any desired thickness or shape with selected surface finish.

20

The Sheffield Crushtrue Roll Bank plan provides Rolls for production use while worn rolls are enroute to Sheffield for re-grinding and re-ground rolls are enroute from Sheffield for use. Nominal exchange charge.

21

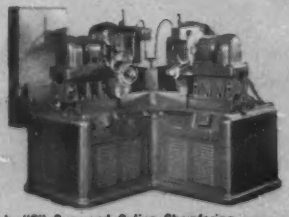


Gear and Spline De-burrers deburr or chamfer up to 600 gear teeth per minute. Applicable to spur, helical, hypoid, bevel and herringbone gears —also multi-start worms.

22

Gear and Spline Chamfering Machines chamfer, burr or recess the ends of gear teeth at high production rates—ideal for short runs and quick changeover.

23



Style "C" Gear and Spline Chamfering machines have two cutter spindles and two workheads for mass production gear manufacture.

24

Sheffield is prepared to produce precision threaded elements and formed parts on contract to augment your own manufacturing facilities.

25

4785

Write for Engineering Data on any or all of these tools identifying them by key numbers in the white squares.

Division 000 • The Sheffield Corporation
Dayton 1, Ohio, U.S.A.

MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Separating the Men from the Boys

Nineteen fifty-five looms as the most competitive year since prewar days. How ready are you to meet this challenge?

How up-to-date is your product? Does it outmode your old product sufficiently that your customers are willing to lay money on the line for it?

The automobile people have discovered, from bitter experience, that the costliest kind of policy is to try to slide along with a few minor changes while competitors are making major changes. Lost markets and serious slippage in standing are the result. The "comeback" road then proves to be pretty rough.

What has happened in the automobile industry has happened elsewhere, with devastating effect upon the standpatters who have done little or nothing to improve their products. Aggressive competitors, with new and attractive products to offer, have whizzed by the slow-pokes.

Even after you have redesigned your products, you still have a big job to do—selling them. In easy times, superior products may sell themselves. But times are not that good now. Too many companies have too many tempting products for the management of any business to rely smugly upon orders flowing in freely by mail. It is necessary to put into action a promotion and selling program that carries your message directly to your customers.

Some managements, of course, do not need to be reminded of these fundamentals. There is the case of a prominent machinery builder who has supplemented his regular promotion program by bringing customers and prospects to his plant for one-day visits.

This company has a magnificently equipped manufacturing plant to show, a spic-and-span technical training center in which it does a superior job of teaching apprentices to become machine operators and technicians, and a new and intriguing line of products. The day's program comes off with a flourish and with a fine sense of showmanship.

With a combination of modern production facilities, redesign and improvement of products as well as development of brand-new products, and superb salesmanship, this company should do all right in 1955.

There are other equally effective methods of accomplishing much the same objective in a less spectacular way. One production equipment maker has conducted a series of so-called seminars on machining techniques at its plant. Key personnel from customers' organizations attend these seminars and have a chance not only to learn more about the art of machining, but also to inspect the maker's modern factory and its newly-designed machines.

Many small manufacturers do not have the resources to do what these two companies have done. But that fact should not paralyze management from taking some kind of constructive and effective action, with commensurate results.

Next year looks like a good year for Metalworking. It won't be good for everybody, however. For those who choose to sit on their hands and merely hope, it will prove disappointing. The sluggards can look forward to unhappy days.

For alert management, on the other hand, 1955 will be a year of challenge. It will be a year in which it will improve its position, get a larger share of the market and put itself in a commanding spot as it faces the years ahead.

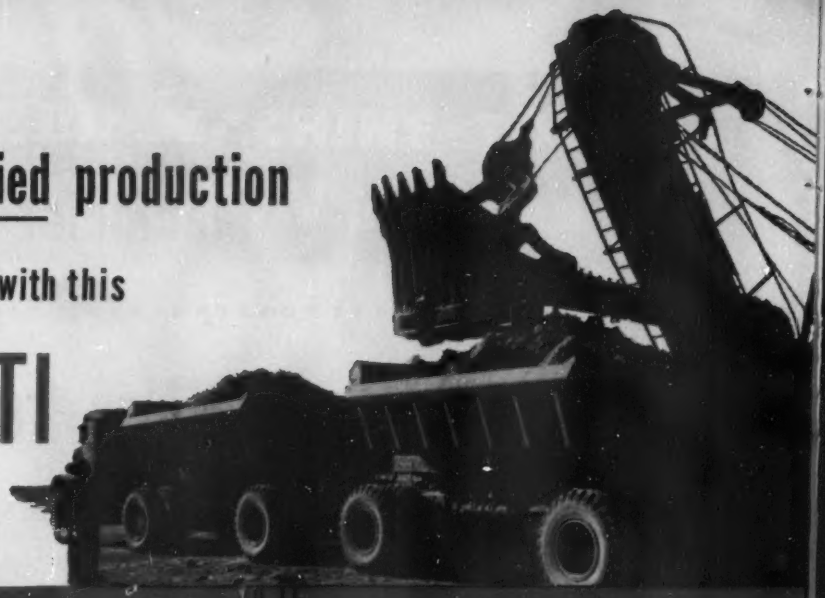
It will be a year in which the men are separated from the boys.

Burnham Finney

EASTON simplified production

and improved product with this

CINCINNATI
Press Brake



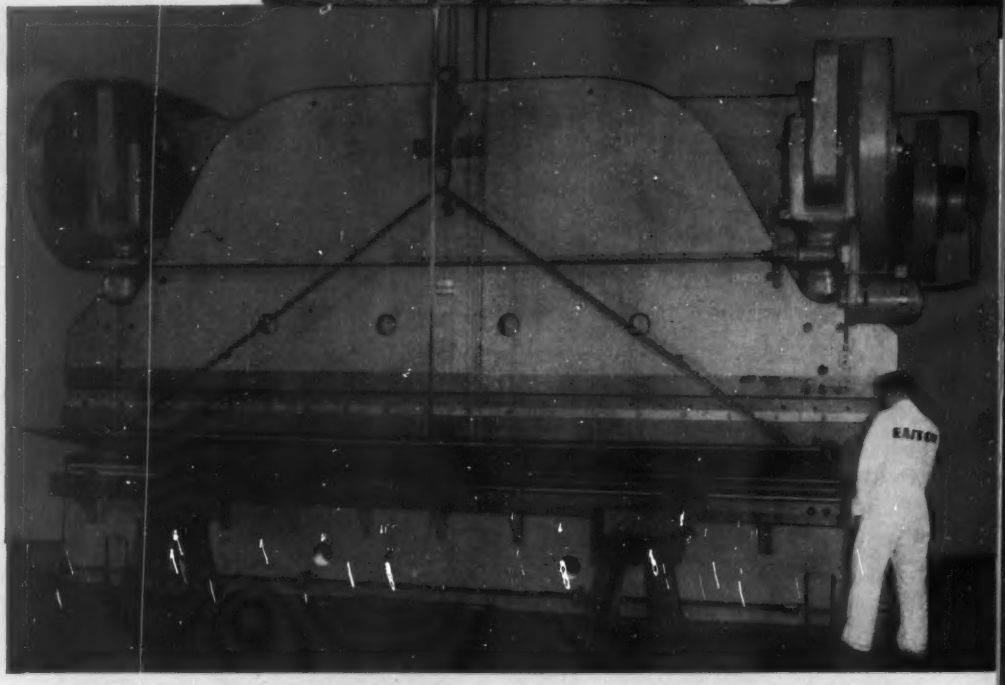


Illustration courtesy Easton Car & Construction Company, Easton, Pennsylvania.

Here a Cincinnati Press Brake is forming ½" plate for wide sections of off-highway trailers, at the Easton Car & Construction Company, makers of a large line of products for industrial transportation.

By using this Cincinnati Press Brake, some welding operations were eliminated, which improved the product, and reduced production costs at the same time.

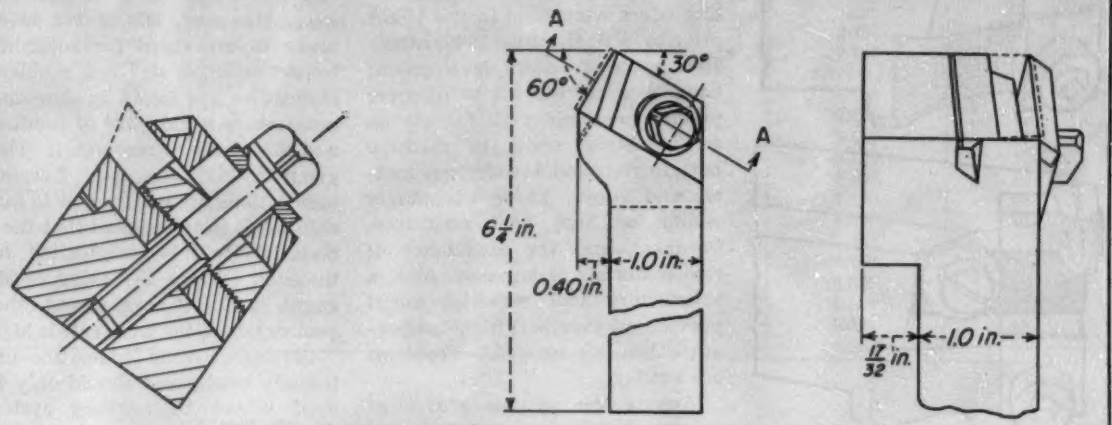
The power, accuracy, and versatility of Cincinnati Press Brakes are reducing manufacturing costs where ever they are installed. If you form, or bend, you should investigate their possibilities.

Write for Press Brake Catalog B-4.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES



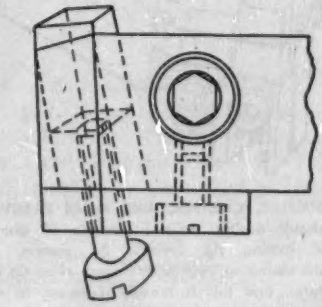
TOOL SHANK, Soviet design, for holding cutting tip in normal position. Mechanical clamping arrangement also can be used for carbide tools

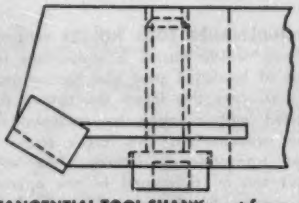
Russian report ...

Ceramic-tipped tools will cut steel

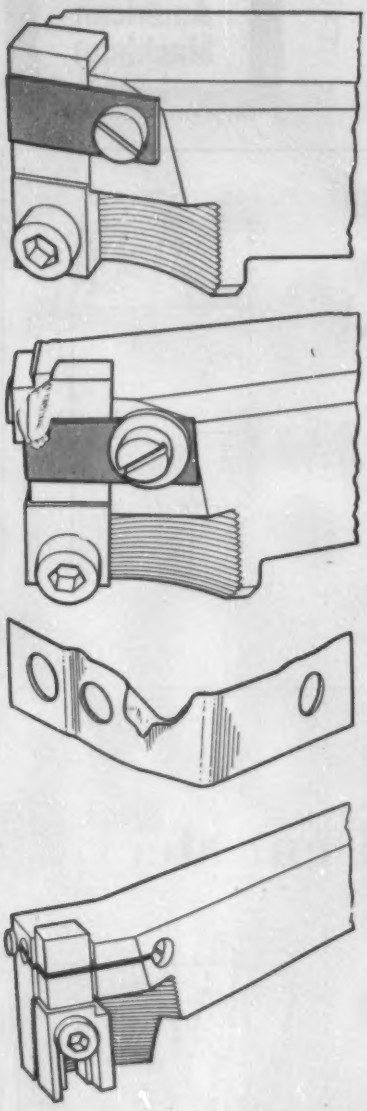
Rumors tell us that ceramic cutting tools may have a place in Metalworking. But where is that place? We have asked people in the U S and in England, where we first heard of them. "Yes, ceramic tools are good for cutting hard materials, with light cuts—but they're no good for steel." When we probed further, no definite answer was forthcoming —and no details. Then we received some fairly detailed information on Russian experience—a surprising thing. (Remember that Russian "policy" often claims factual accomplishment for plans on paper—then read our roundup of their ideas with an open mind.)

Ceramic cutting tips are not new. However, applications reported thus far have been limited to machining of plastics and easily machinable metals or alloys. Experiments on the cutting properties of ceramic tips have been carried out for a number of years, in various countries. For instance, Dr. Osenberg reported (*Maschinenbau Betrieb*, 1938, No. 5/6) interesting results in machining plastics with ceramic tips. Results were obtained under laboratory conditions and were not further developed for industrial use. Experimental work in England during World War II involved machining both ferrous and non-ferrous metals, but very little came of it production-wise. Post-war development in England resulted in commercial production of ceramic-tipped cutting tools but, again, only for the limited uses described above. The tip material in these tools is sintered corundum with a cobalt binder. Generally speak-





TANGENTIAL TOOL SHANK most frequently used. One disadvantage is high manufacturing cost of accurate slot edges. Also, shank is easily damaged and stress concentrations result from clamping and similar uneven loads



SIMPLER, CHEAPER, AND MORE PRACTICAL shank design reduces danger of damage if cutting tip breaks. As shown, only the clamping strip is damaged when tip fractures, and this is readily replaced. In more recent designs, this holding strip has been replaced by a steel wire which is even simpler and seldom is damaged

CZECH-DESIGNED TOOL HOLDER consists of a body which carries a supporting insert made of hardened steel and having ground surfaces. Into this insert the cutting tip is inserted and clamped by the plate and screw combination. The larger screw provides transverse adjustment. Two cutting edges can be sharpened in one operation. The cutting tip is stressed solely by the cutting forces and the supporting insert is sufficiently hard to resist abrasion. Replacement of the ceramic tip is simple and fast. The only disadvantage is the high accuracy required in manufacturing

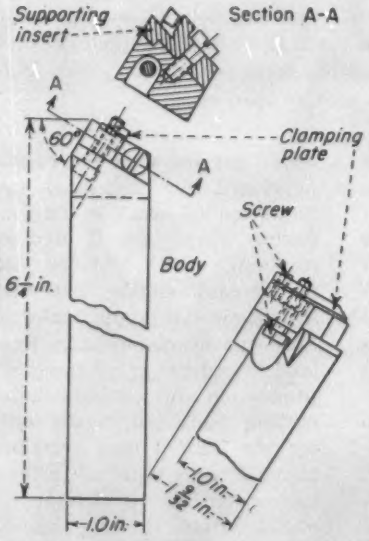
ing, ceramic tips are excellent in resisting the abrasion caused by plastic materials but they are very brittle; have no impact resistance at all.

In single instances, ceramic cutting edges were used in the USSR prior to WW II. Since 1947, intensive research and development have been carried out to discover practical ceramic tools for use on an industrial scale, to machine both ferrous and non-ferrous metals and alloys. Three advantages would be high heat resistance, hardness, and the abundance of raw materials at low cost. Also, a satisfactory tool material might provide an excellent high-temperature bearing material. Problems are similar.

Among the various grades of ceramic materials now being produced in Russia are: thermocorundum, S, L-2, TsV13, TsV13(1), TsV-18, and TsM-332. The best grades appear to be TsM-332 and TsV-18. Ceramic plates made from these materials have the following mechanical characteristics:

Spec gravity - 3.85 to 3.95
Comp strength - Up to 420,000 psi
Hardness - Up to R_A 90
Heat resistance - 3452 to 3542 F
Bend strength - Up to 56,000 psi

Bending strength of ceramics is considerably lower than that of cemented carbides, but the hardness and high temperature strength of these ceramic tips are much superior to carbides. At present, ceramic-tipped cutting tools are largely used for semi-finish and finish machining of iron and steel. However, efforts are being made to use them for roughing. Impact strength still is a problem. Difficulties are found in obtaining satisfactory uniformity of product, and this phase of research is being given special attention. Ceramic applications are not limited to machining. It is anticipated that these materials will be substituted for tungsten carbide in boring heads, gages, sandblast nozzles, and other devices where the wear rate is high.



Ceramic cutting edges are extremely brittle and should only be used where the cutting system (machine tool, component, and cutting tool) is sufficiently rigid; vibration must be avoided. Ceramic tools should not be used to machine the hard "skin" from an iron casting, nor to scale the top layer of steel pieces. Also, these tools will not satisfactorily machine components having sudden changes in the chip cross-section. If parts have not been machined at their ends, rough edges should be chamfered away with another type of cutting tip before using ceramic tools. For this purpose combination cutting tips have been developed.

Because their heat resistance is very high, ceramic cutting tips can be used without coolant. However, if the work material is such that coolant must be used, the tool and the work must be flooded with coolant before cutting starts. The heat *conductivity* of ceramic tools is very low, hence unequal heating will crack the tip. Ceramic cutting edges will produce a work-surface quality equal to that obtained with a carbide-tipped tool.

Grinding of the cutting edges is best accomplished with a green carbide wheel having a ceramic bond; 46,60 or 80 grit, and a hardness of I to J on the Norton scale, but not exceeding K. If black carbide wheels are used they should be one or two grades softer than the specifications for green wheels. Surface speed should be 2000 sfpm. Lapping is done on a CI disk, using

table I ... CONSENSUS OF SHOP RESULTS WITH "THERMOCORUNDUM"

USE	MATERIAL	FEED, IPR	SPEED, SFPM	DEPTH OF CUT, IN.	TIME BETWEEN GRINDS, MIN.
Grooved cylinders, shafts, worm gears	Steel	0.015-0.030	350-450	0.030-0.080	18
Pulleys, gears, bushings (skinning)	Cast gray iron semi-chilled 2-28	0.006	670	0.100	12
Shafts and spindles	Steel 35	0.008	390-600	0.160	60
Shafts and spindles	Steel 45	0.010	250-450	0.120-0.160	45
Shafts and spindles	Steel 45	0.012	550	0.200	65
Coupling sleeves	Steel 45	0.010	270-400	0.100	60
Disks	Steel 3	0.010	1100	0.120	45
Gears	Steel 45	0.012	600	0.120	70
Various components	Steel 20	0.004	500	0.100	60
	Cast Iron	0.004	700	0.120	45
	Steel 35	0.008	1400	0.040	50
Facing 20-in. dia	Stainless steel YeZh 2	0.010	600	0.160	30
	Steel 45	0.006	2250	0.080	55
	Steel KhVg	0.009	1200	0.100	30
	Steel U 10A	0.012	1100	0.080	45
	Steel 30	0.016	900	0.120	90

table II ... COMPOSITION OF RUSSIAN METALS, % (NO EQUIVALENT SAE STANDARD)

	CARBON	MANGANESE	SILICON	PHOSPHORUS (MAX.)	SULFUR (MAX.)	CHROMIUM	NICKEL
Steel 3	0.14-0.22	0.40-0.65	0.12-0.30	0.050	0.055	—	—
Steel 20	0.15-0.25	0.35-0.65	0.17-0.37	0.045	0.045	0.30	0.30
Steel 30	0.25-0.35	0.50-0.80	0.17-0.37	0.045	0.045	0.30	0.30
Steel 35	0.30-0.40	0.50-0.80	0.17-0.37	0.045	0.045	0.30	0.30
Steel 45	0.40-0.50	0.50-0.80	0.17-0.37	0.045	0.045	0.30	0.30
Steel U-10A	0.95-1.09	0.15-0.25	0.30	0.030	0.020	0.20	0.25
Steel KhVG	0.90-1.05	0.80-1.10	0.15-0.35	1.2 to 1.6% Tungsten		0.9-1.2	—
Steel YeZh-2	0.15-0.25	0.50	0.70	0.030	0.035	12-14	0.60

Strength of Gray Iron 12-28, psi: Tensile —17,000; Bending — 39,200; Compression — 70,000

boron carbide paste, at 300 to 400 sfpm.

The cutting tip can be brazed or cemented to the tool holder, or it can be mechanically clamped or held by the cutting forces. Tool shanks for holding sintered corundum cutting tips must be designed with consideration for the specific properties of the material. Thus, it is necessary to minimize the mechanical stresses, to prevent stress concentration by providing a perfect contact surface, to provide sufficiently hard supporting surfaces, and to minimize the time necessary to replace cutting tips. Also shanks should be designed to eliminate the danger of damage to them if the cutting tip cracks. A properly designed shank is equally useful for carbide tips. However, while good, mechanical clamping does not eliminate local stress concentrations nor the time lost during replacement of the cutting tip. Techniques and applications are described in the illustrations and in Table I. (One author claims that the development of ceramic-tipped cutting tools in the Soviet Union is far ahead of developments in East Germany, Czechoslovakia, Poland, and Hungary, in all of which research is underway.)

BIBLIOGRAPHY

Machining of Metals With Thermocorundum Cutting Edges, by G F Kudsov, *Stanki i Instrument*, No. 5, '52, p14-16

Machining of Metals With Thermocorundum Cutting Tools, by P P Grudov & M P Tsiganova, *Stanki i Instrument*, No. 4, '52, p10-12 (Also *Engineers Digest*, Feb '53, p59-61)

Application of Ceramic Materials for Machining Metals, by A I Isaev, N. N. Zorev, and L K Luchma, *Ibid*, No. 4, '52, p12-14 (Also, *Engineer's Digest*, Feb '53, p51-52)

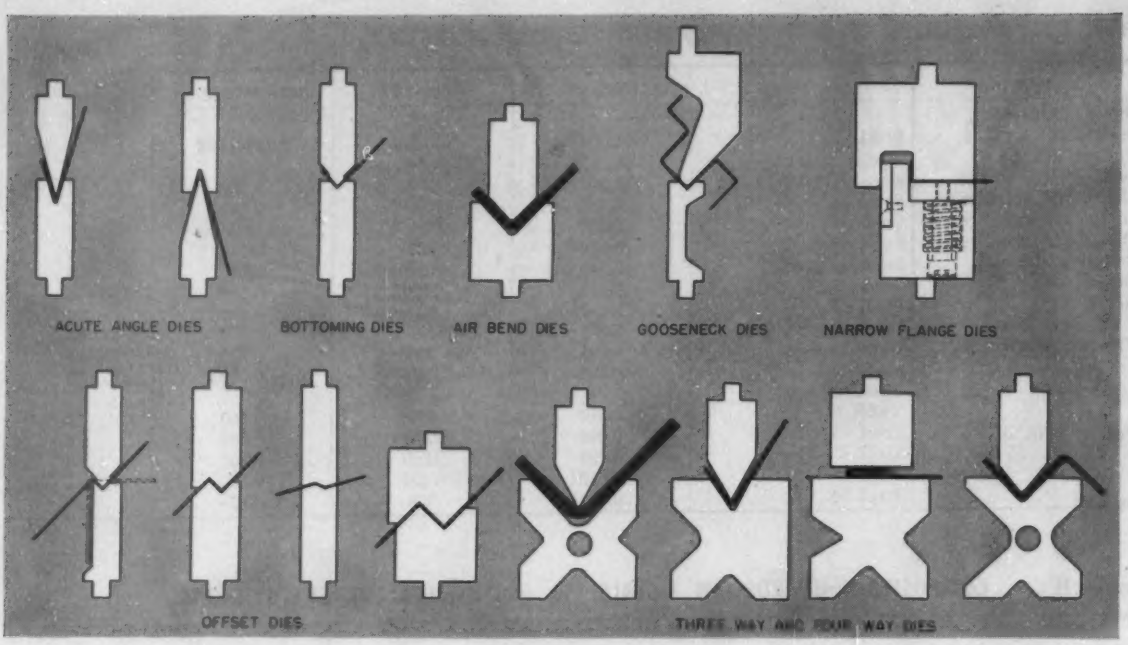
New Material for Tool Cutting Tips, by M M Karatygin and N F Kasakov, *Vestnik Mashinostroeniya*, 1952, No. 4, p87-90

Hardness of Tungsten Carbide and Mineral-Ceramic Materials at Elevated Temperatures, by A I Betaneli, *Ibid*, No. 4, '53, p49-52

New Machining Tests with Ceramic Cutting Edges, by A Richter, *Fertigungtechnik*, No. 10, '52, p291

Cutting Tools with Sintered Corundum Tips, by J Koloc, *Strojirenstvi*, No. 1, '52 p48-49

Influence of the Properties of Corundum on the Design of Tool Holders, by F Vintner, *Strojirenska Vyroba*, No. 3, '54, p100-102



Versatile producer...the press brake...IV

For safety, bend according

Working loads on the press brake vary sharply with inside radii of the bends. On difficult jobs, use of a "tonnage indicator" is desirable to avoid overload and possible harm to the cranks and alignment

Bending is a more common press-brake operation than piercing, blanking and draw forming. Press-brake makers usually rate their machines in terms of capacity to bend metal over a V-die with an opening eight times the metal thickness. For example, a "Cincinnati" Model 90-10 can make a 90° bend in a 10-ft length of ¼ in. steel plate, whereas a "Chicago" Model 510-D has the same working capacity. Other makes are similarly rated, always based on mild steel having a shearing strength of 50,000 psi.

The working load required to form a 90° bend depends on the width across the V-die in relation to metal thickness, Table 1. Selection of the wrong V-die opening for a bending job will overload the press brake, perhaps causing damage to the cranks or the bed-to-rail alignment.

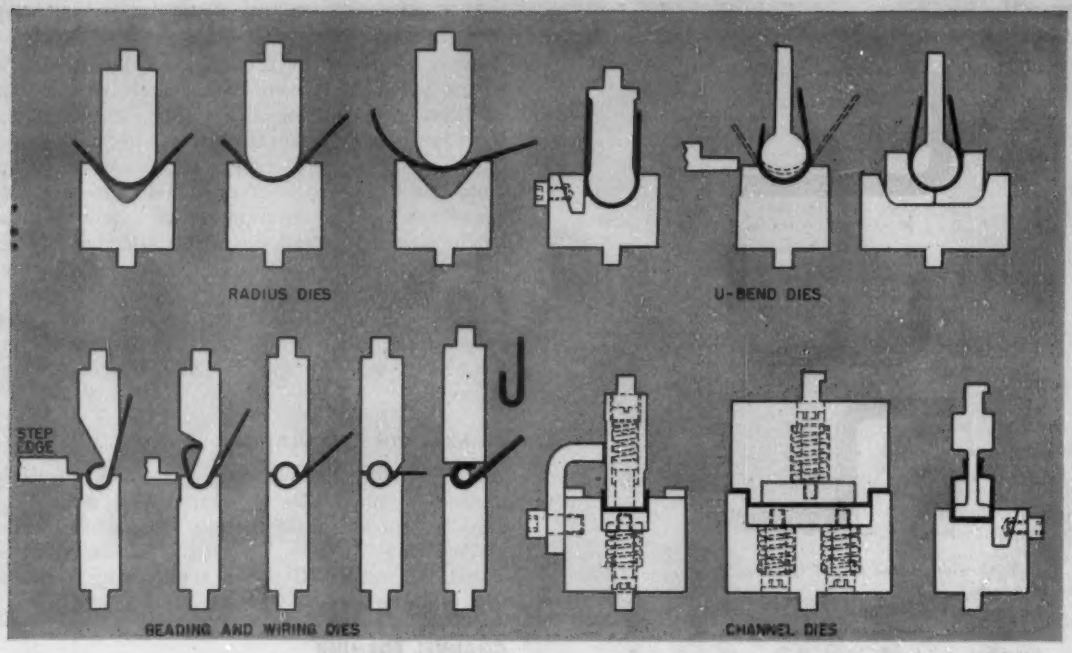
The overload hazard can be illustrated by the loads required to form 90° bends 10 ft long in ¼-in. mild-steel plate, using three different inside radii:

(a) *Standard inside radius from standard die opening:*
(Die opening 8 times metal thickness)
¼-in. plate over 2-in. die requires 15.0 tons per ft
15.0 T/ft. × 10 ft = 150 tons.
Inside radius is approximately 5/16 in.

(b) *Smaller inside radius from smaller die opening:*
(Die opening 6 times metal thickness)
¼-in. over 1½-in. die requires 22 tons per ft.
22 T/ft × 10 ft = 220 tons
Inside radius is approximately 15/64 in.

(c) *Larger inside radius from larger die opening:*
(Die opening 12 times metal thickness)
¼-in. over 3-in. die requires 9.2 tons per foot.
9.2 T/ft × 10 ft = 92 tons.
Inside radius is approximately 15/32 in.

These calculations indicate the extreme changes



Earlier parts of this series appeared in AM: I . . . Sept 14, 1953, II . . . Jan 4, 1954, III . . . Feb 1, 1954

to the rules

J M MATTHEWMAN, works manager
JAMES SMART PLANT,
CANADA FOUNDRIES & FORGINGS, LTD. BROCKVILLE, ONT

in working load imposed by bending various inside radii in the same material. RULE: Eliminate sharp-radius bends wherever possible. Do not attempt to make a bend sharper by hitting the workpiece harder. This practice results in damage to the equipment and lost productive time.

Do not alter the angle on the die. If a die is designed with a more acute angle to compensate for springback, some variation in the angle of the bend, because of material temper and thickness, must be tolerated.

RADIUS FORMING

Modern styling of metal products requires rounded corners and edges instead of sharp or square bends. Finishes will reveal the slightest unevenness in these rounded contours, thus forming operations must be smooth and accurate. Although these radii appear simple, many problems occur in practice. As a rule, an included angle of 86° will compensate for springback in light-gage material, but no formula can be given for all cases. Frequently, the die shape must be developed.

Table 1 . . . TONS PRESSURE PER FT FOR 90° BENDS IN MILD STEEL

THICKNESS OF METAL	WIDTH OF FEMALE DIE OPENING													
Gage	¼	⅝	¾	½	⅝	¾	⅞	1	1⅛	1¼	1½	2	2½	3
20	2.6	**3.0**	1.6	1.1										
18		4.0	**2.9**	2.0	1.6	1.3								
16		7.0	5.6	**3.6**	2.7	2.0	1.7							
14			8.8	5.9	**4.4**	3.4	3.0	2.5	2.0					
13				10.0	6.5	**5.4**	4.3	3.7	3.3	2.9				
12					10.0	7.4	**6.2**	5.4	4.4	4.0				
11						10.5	8.4	7.1	6.2	5.4	4.3			
10						14.0	11.3	9.5	**8.0**	7.0	5.4	4.0		
⅜								16.0	14.0	11.2	7.5	5.8	4.5	
¼									28.0	22.0	15.0	11.5	9.2	
⅛										36.0	26.0	18.8	15.0	
⅜											38.0	29.0	22.5	
⅛												42.0	33.0	
½													46.0	

FIGURES IN BOLD FACE ARE FOR THE OPENINGS EIGHT TIMES THE THICKNESS OF THE METALS

BENDING PRESSURES REQUIRED FOR OTHER METALS AS COMPARED TO MILD STEEL

Inconel one-third of pressure shown
Soft brass one-half of pressure shown
Aluminum (soft) one-third of pressure shown
Aluminum Alloys (heat-treated) same pressure shown
Stainless steel one-half more than pressure shown
Chrome molybdenum double the pressure shown

Versatile producer ... The press brake ...

continued

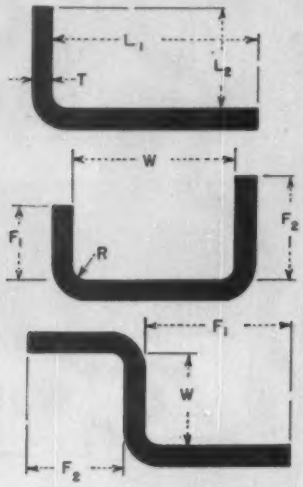


FIG 1 ... Blank width where $R = T$ is determined by *inside dimensions* to bends:
For angles, blank width $= L_1 + L_2$
For channels, blank width $= W + F_1 + F_2$
For offset or Z bends, blank width $= W + F_1 + F_2$

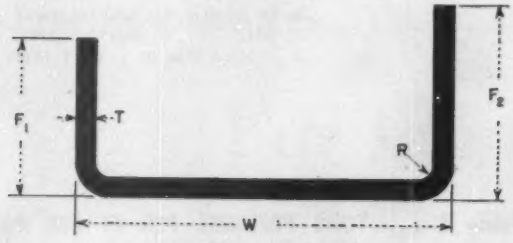


FIG. 2 ... When R ranges from 0 to 3 T, dimensions are taken to outside of bends. Example: blank width $= (W + F_1 + F_2) - (3\frac{1}{2}\ T + R/2)$. To use this formula on multiple bends, add all *outside dimensions* around the piece and deduct $(3\frac{1}{2}\ T + R/2)$ for each two bends

If kinks develop in attempting large-radii shapes in light-gage metals, they may be eliminated by using a spring pad or a rubber pad in the die. The spring pad also prevents the metal from slipping, as often occurs during forming of a large radius on the edge of a wide sheet. The rubber pad has advantages in forming large radii, because a change from one radius to another is made by press-ram adjustment. The minimum radius is governed only by the size of the male die. Spring-loaded and rubber-pad dies can be used for the same radius bends on several thicknesses of metal, but the inside dimension of the radius remains constant. If the *outside* dimension must remain constant, a male die of correct size must be used for each thickness of metal.

BLANK-WIDTH CALCULATION

Many methods have been published for determining the blank size for shapes having 90° bends. All of these are experimental. Blank sizes depend on accuracy of gage, temper, grain direction and speed of forming. The data shown with Fig. 1 and 2, will serve for job tryouts.

CHANNEL FORMING

A variety of channel shapes are made in sheet metal and plate work, sometimes in two strokes in standard dies. (See Fig. 3, 1st and 2nd strokes). However, for close accuracy between the channel legs, the shape should be formed in one operation. Formula for tonnage required for channel bends:

$$P = \frac{S\ L\ T}{3{,}000}\left(1 + \frac{T}{W}\right)$$

where

P = Tonnage required
S = Tensile strength of material, psi
W = Width of female die, in.
T = Thickness of stock, in.
L = Length of workpiece, in.

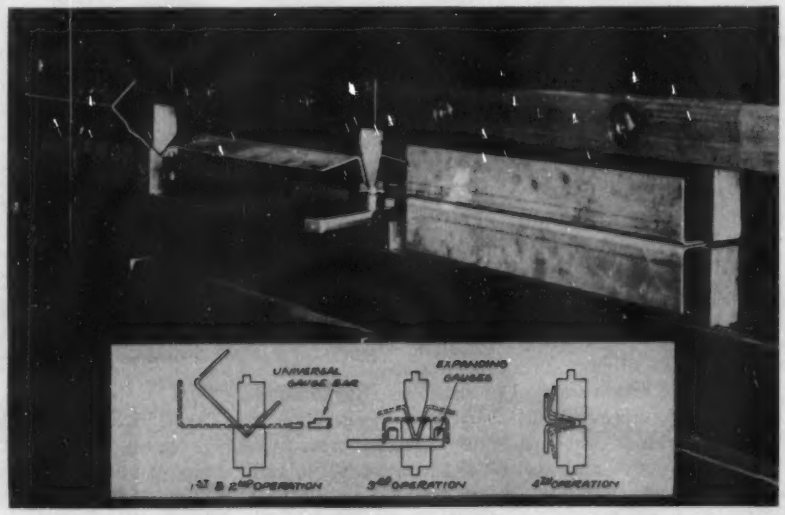


FIG. 3 ... Progressive operations should be used whenever the width of press brake and part size permit. Minimum handling reduces job-cycle time *Cincinnati Shaper Co*

FIG. 4 . . . Embossing, squeezing and coining severely load a press brake. A large-area embossing die is supported by a bolster and ram angle plates, when making a railway-crossing sign

Cincinnati Shaper Co

Stripping from channel dies is a frequent problem when the material thickness exceeds that for which the dies are designed. Over-gage metal will be scuffed during forming and will stick in the lower die. If variable material thickness cannot be eliminated, channel dies should be fitted with a stripping pad and a release wedge.

Direct-reading micrometers on the motorized ram adjustment have proved useful. When the proper shut height has been determined, the ram-setting reading is stamped on the die set. This saves time repeating the shut-height test on subsequent runs of the same job. This reading may be adjusted to an accuracy of 0.001 in. to compensate for variations in material thickness between one production run and another.

It is advisable to use cold-rolled metals for their closer gage tolerances for all embossing work. A slight increase in the workpiece thickness will impose severe overload on the press or cause it to jam at bottom stroke.

OPERATING PRECAUTIONS FOR PRESS BRAKES

1. Establish a regular practice of changing or setting dies with the ram about 5° *past* bottom stroke. Accidental movement of the ram in this position can only move it upward. Mark this position on the drive gear and attach an indicator to the gear guard to show the tool-setter that he is adjusting dies at the correct position.

2. Locate the tooling to distribute the working load equally between both pitmans.

3. Avoid exerting extreme pressures on short-length dies, which may damage the original accuracy of the bed-to-ram alignment.

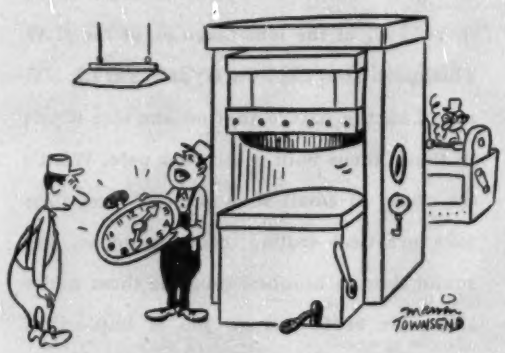
4. Develop tooling setups to distribute the working load equally "fore and aft" of ram centerline.

5. Do not underestimate the tonnage required to make simple bends, single or multiple. Bends in "bottoming dies" impose severe stresses on the machine, particularly during the start of the bend. Check load calculations carefully or refer to the "Tonnage Indicator."

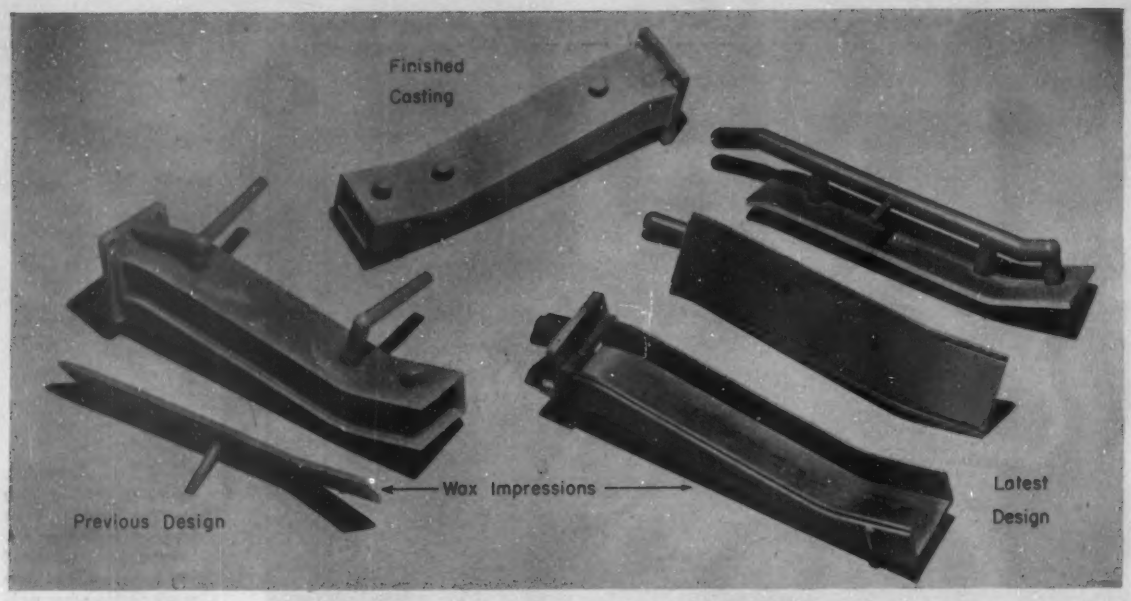
6. Make certain that the machine installation has been accurately levelled; re-check levels after a few months' operation.

7. Don't scrimp on die cost for volume-production runs. Use a top-quality, non-deforming die steel in the SAE 1045/1080 group with working surfaces hardened by flame or induction heat-treating processes.

8. Take advantage of the technical service provided by the press brake builders, especially when developing new or unusual jobs. Their experience covers many hundreds of machines and many thousands of jobs.



"How many times have I asked you, Melvyn, not to leave your watch on the machine?"



SOUND SHOP TECHNIQUES yielded castings that conformed to specifications for a wave-guide section with smooth walls, free from undercuts, cracks, and scratches. Comparing previous design with latest, note difference in gating, seam construction and separate panel section. Wax impression could not be made in one piece because of difficulty in pulling "S" shape of part, and because a collapsible-sectional core would have left parting lines inside the wave-guide section

Intricate investment castings require shop "savvy"

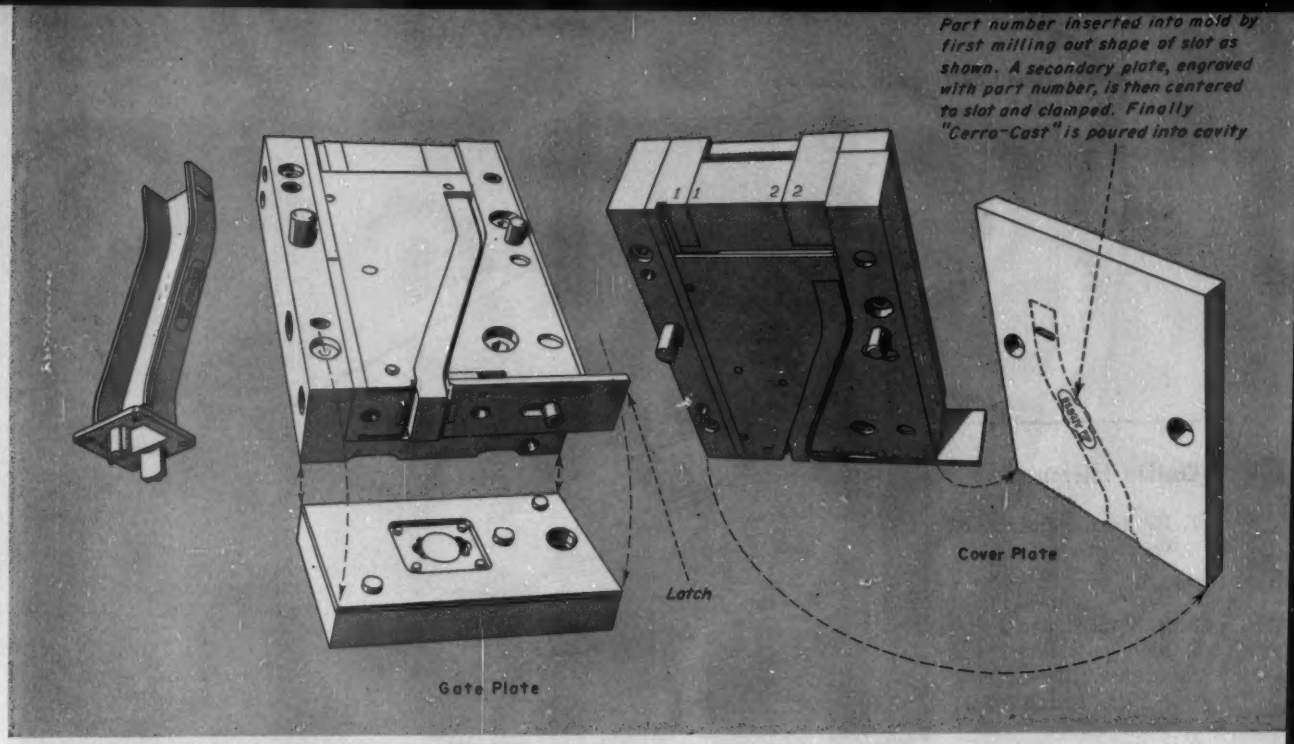
JOHN P WRIGHT, associate editor

Can Metalworking ever hope to get along without the small jobbing shop? Judging from past and present performances, this is highly unlikely. Typical of most small shops, 50% of the jobs taken on at the K W Thompson Tool Co, New Hyde Park, LI, NY, are of such a nature that no one else wants to touch them with a ten-foot pole. What's the secret of small-shop success? Just this: take practical tooling, common sense, and sound shop techniques, combine them under the same roof, and no job is impossible. Here are a few examples . . .

Thompson's latest accomplishment was successful investment casting, on the first attempt, of an "X-Band" wave guide, for Sperry Gyroscope Co. Previously, this same job was being handled by a much bigger and better-equipped outfit who failed to turn out good parts in quantity after many months of experimenting.

Primarily, here's why the job failed . . .

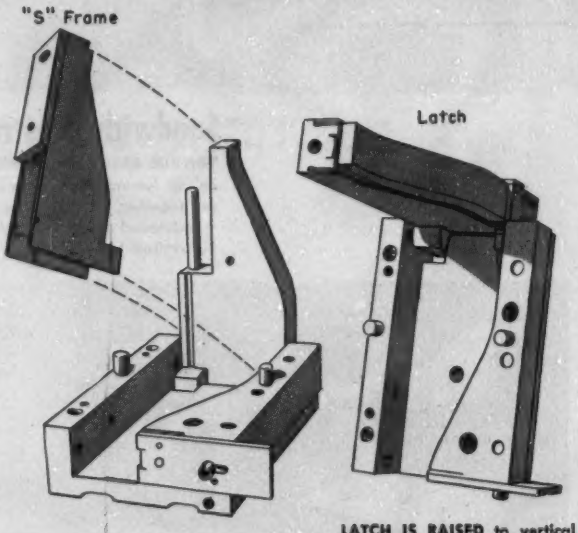
1. One of the molds was designed to make the narrow side of the wave guide with a single step around the edges, with the net result that it received very little support to prevent warping.
2. When halves of the wax impressions were assembled, coinciding edges did not line up, nor seal off at the seams, resulting in radiation loss and attenuation.
3. Inside the wave-guide section, undersides of bosses were concave, causing further failure from attenuation and reflection losses.
4. The "S"-shaped guide section was skewed, throwing its common centerlines and end faces out of parallelism tolerance.
5. The mold for the main section of the guide was much too heavy and awkward in operation for manipulating by hand.


Part number inserted into mold by first milling out shape of slot as shown. A secondary plate, engraved with part number, is then centered to slot and clamped. Finally "Cerro-Cast" is poured into cavity
1 1
2 2
Latch
Cover Plate
Gate Plate

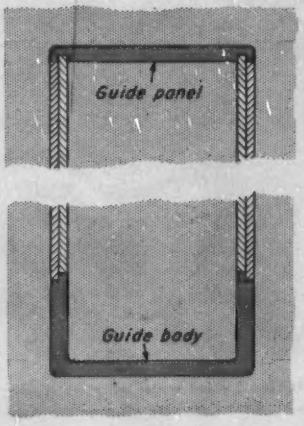
TO PULL IMPRESSION FROM MOLD . . . for body of wave guide—doweled gate plate is removed, flange latch is retracted, and cover plate slipped off dowels, then . . .

Here's how common sense + practical tooling licked the job . . .

1. New design of mold made wax impression panel for larger side of wave-guide section, and "beefed up" this panel with a 5/16-in.-dia runner which also acted as a stiffener.
2. Gating was increased in size and runner feeds into each boss of panel.
3. Five sprues were used instead of the three on the previous design, thereby yielding a more homogeneous wax impression and casting.
4. Each seam on the halves of the wax impression is a tongue and groove, thus assuring tight joints and sharp corners inside the wave-guide section.
5. Tongue-and-groove construction simplifies assembly and eliminates human error. Seams are sealed tight with soft wax applied with a heated palette-knife.
6. Castings now have more uniform wall thickness; skewing of the wave-guide section has been eliminated as well as shrinkage and cracks.
7. Weird design of flange gates was used to eliminate shrinkage around critical edges of flange, which had to be flat and free from indentations. Note design of gates located in center of flange, well away from edges.
8. Molds were designed that material flowed from heavier sections progressively to lighter sections.
9. Previous assembly time for wax impressions was 11 min.; new mold design reduced time to 5 min.
10. Rejects were reduced 60%, production increased 300%, and molds were 60% lighter in weight.



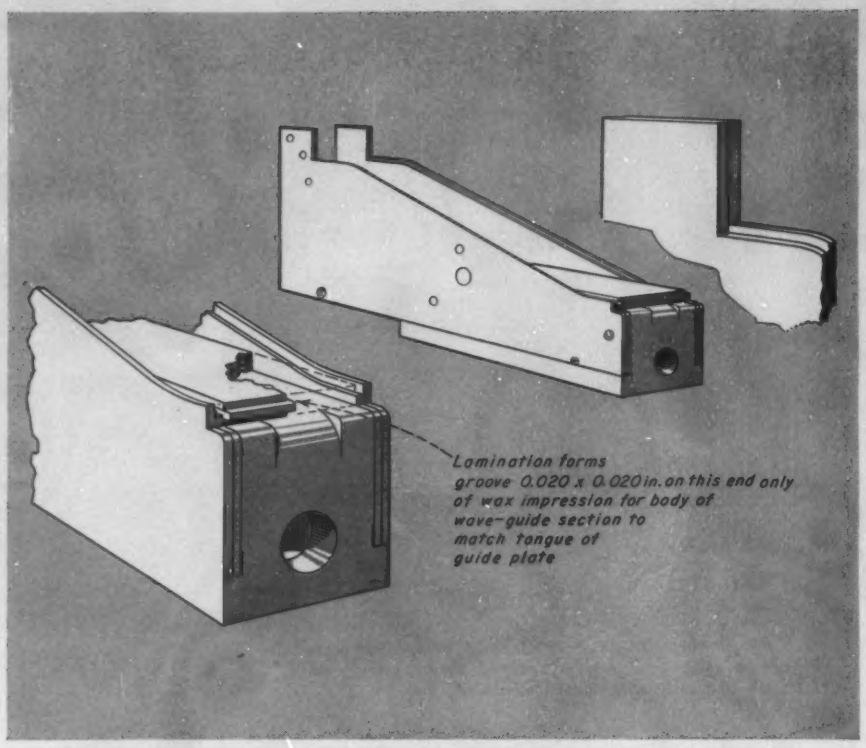
LATCH IS RAISED to vertical position, removable "S" frame with wax impression is slipped from latch and dowel pin—now impression is easily slipped from frame



STAGGERED LAMINATIONS assured alignment of panel to body of wave-guide section over its entire length. Dark area is wax impression

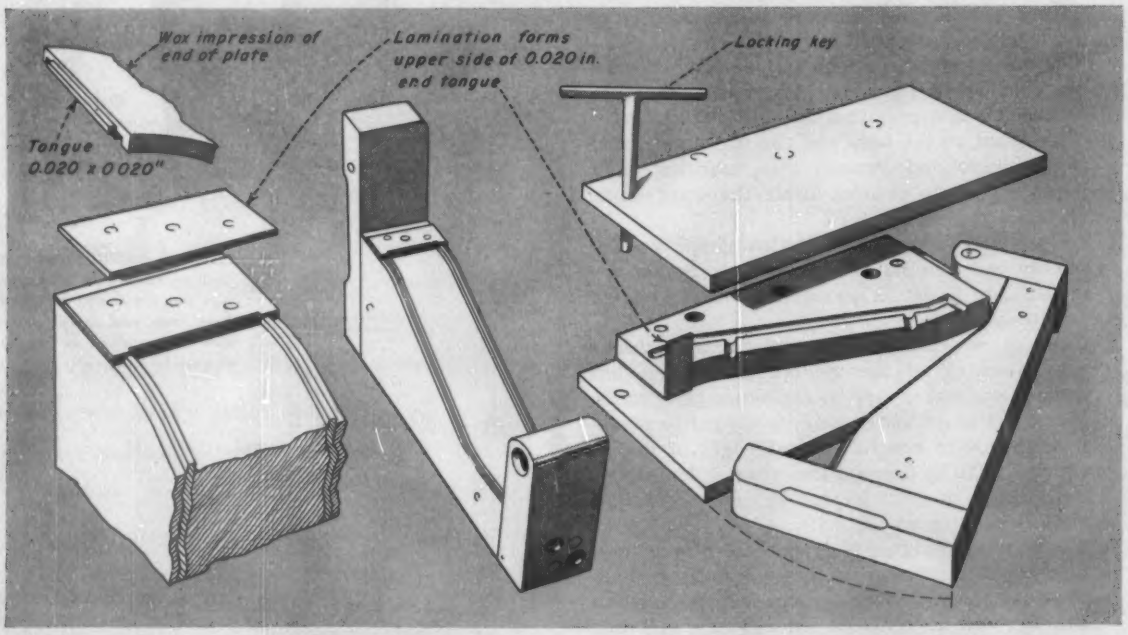
Casting tolerances

1. Inside dimensions of wave-guide section, 0.400 x 0.900 in. were held to ± 0.003 in.
2. End faces and common centerline of the guide section was held parallel to ± 0.005 in. per inch.

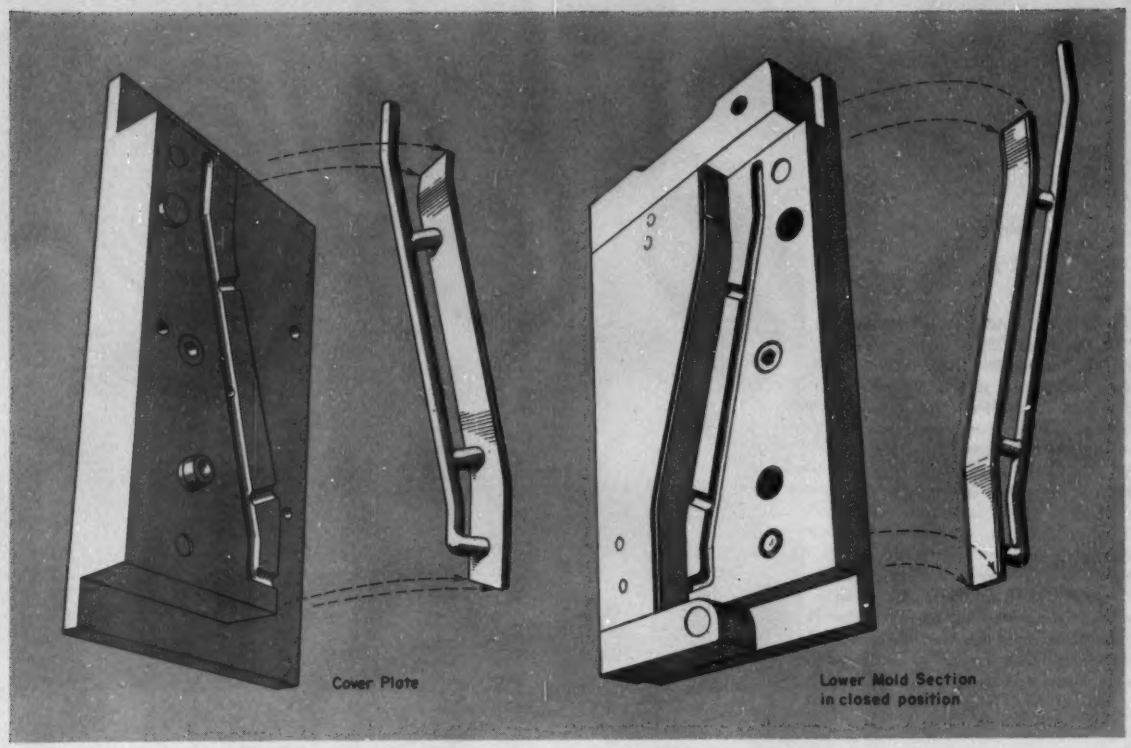

Lamination forms groove 0.020 x 0.020 in. on this end only of wax impression for body of wave-guide section to match tongue of guide plate

Sandwich construction of "S" frame...

TONGUE AND GROOVE SECTIONS of mold were built up from 0.045-in. laminations. "S" profile on all laminations and mold sections were milled on same setup. When mating parts were put together, no light showed through intersections. To form tongue and groove, one lamination is advanced 0.045 in. parallel to mating lamination and doweled. This technique maintains parallelism between all "S" profiles of mold



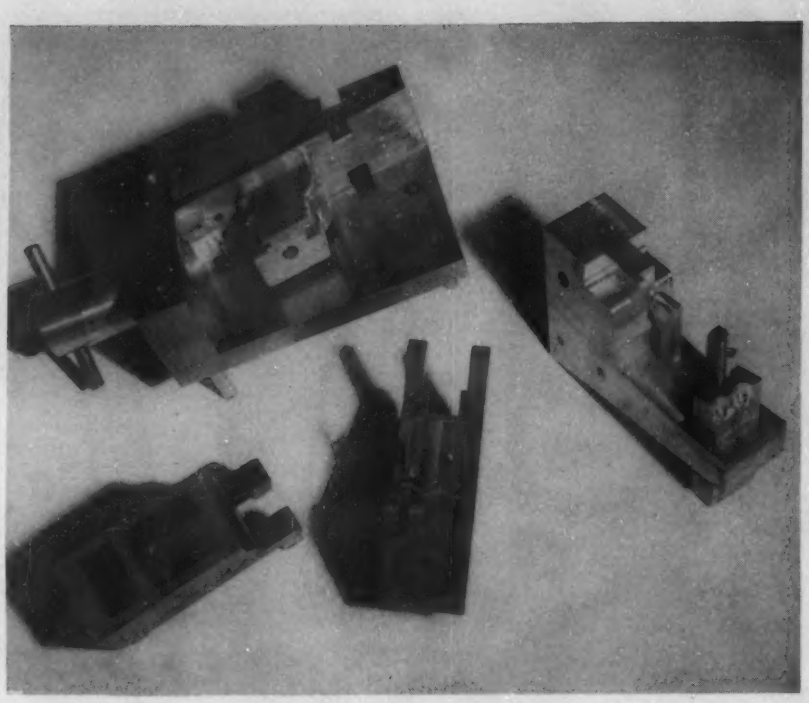
TO PULL IMPRESSION FROM MOLD . . . for panel of wave guide—remove locking pin, lift cover plate, swing latch outward, lift impression from mold



COMMON SENSE COUPLED WITH PRACTICAL TOOLING produced a mold which repeatedly turned out perfect impressions with minimum operator effort and handling. Note generous runner and sprues feeding into bosses of guide panel

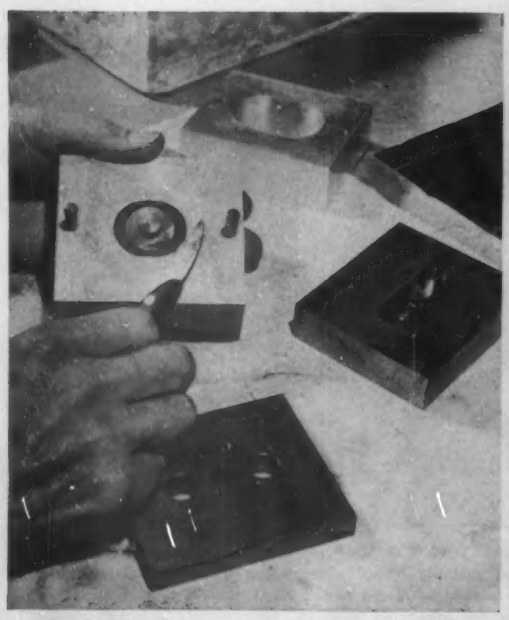
COMPOUND VERNIER INDICATOR DIAL poured from aluminum 356, for Sperry Products submerged ultra-sonic tester used to check flaws in castings and similar parts. Wax impression is made in two stages because volume of wax required to fill cavity would tend to set up shrinkage around vernier graduated lines if shot in one stage. After first wax impression is made, engraved section is cut out, mold is closed and second stage impression is injected. This technique assures sharp, well defined graduated lines on finished casting

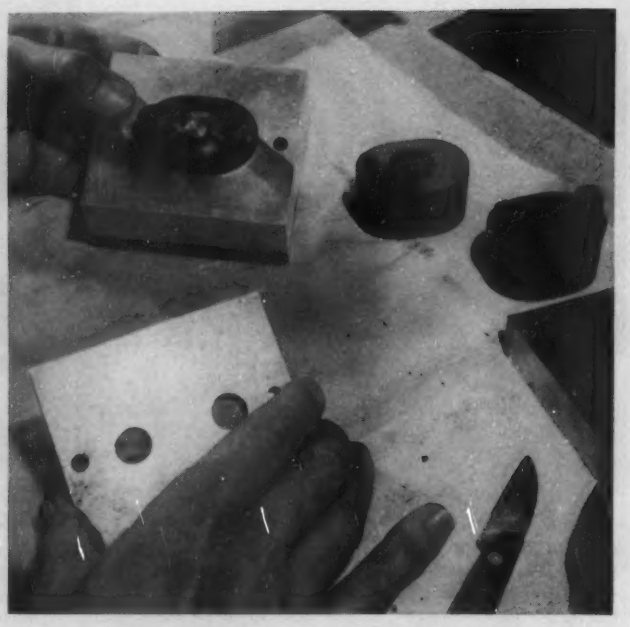
EJECTING SECOND STAGE OF WAX IMPRESSION. Mold cavity was hobbed into "Cerro-cast" and idea of including engraved graduations proved successful and more economical than secondary operation for engraving castings. Idea further assured consistent accuracy and interchangeability of parts



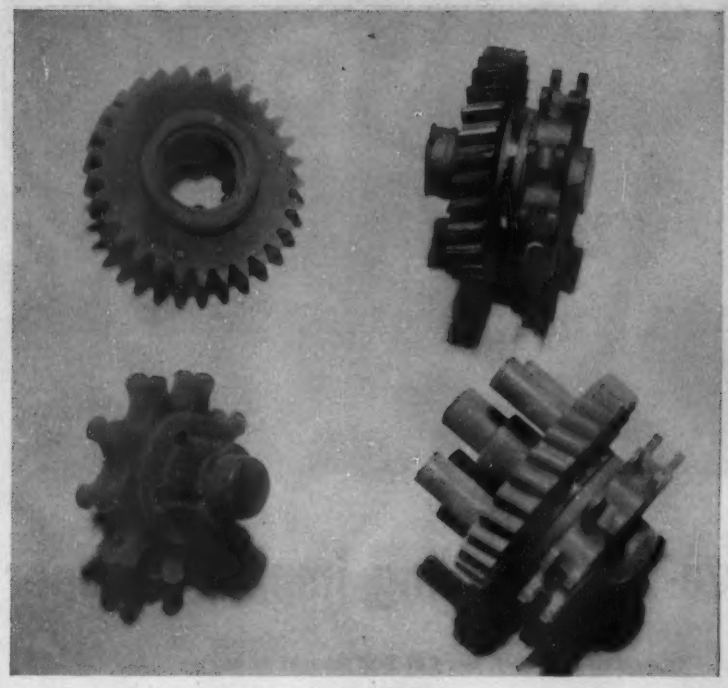
LIGHTWEIGHT CABLE HOUSING made from aluminum 220 contains 10% magnesium, was rigidly designed to withstand tension of steel cable running over motor-driven inner drum used for driving-machine component. Material has excellent machinability in T4 condition, typical tensile strength of 46,000 psi, elongation of 14% and tensile yield of 25,000 psi. Using special foundry techniques because of high magnesium content, this alloy offers highest combination of strength, yield, elongation, and resistance to impact of any aluminum-alloy casting materials. Heats were made in an atmosphere controlled furnace and castings were X-rayed 100%

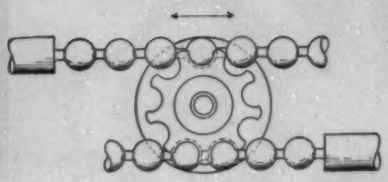
Intricate investment castings . . . continued



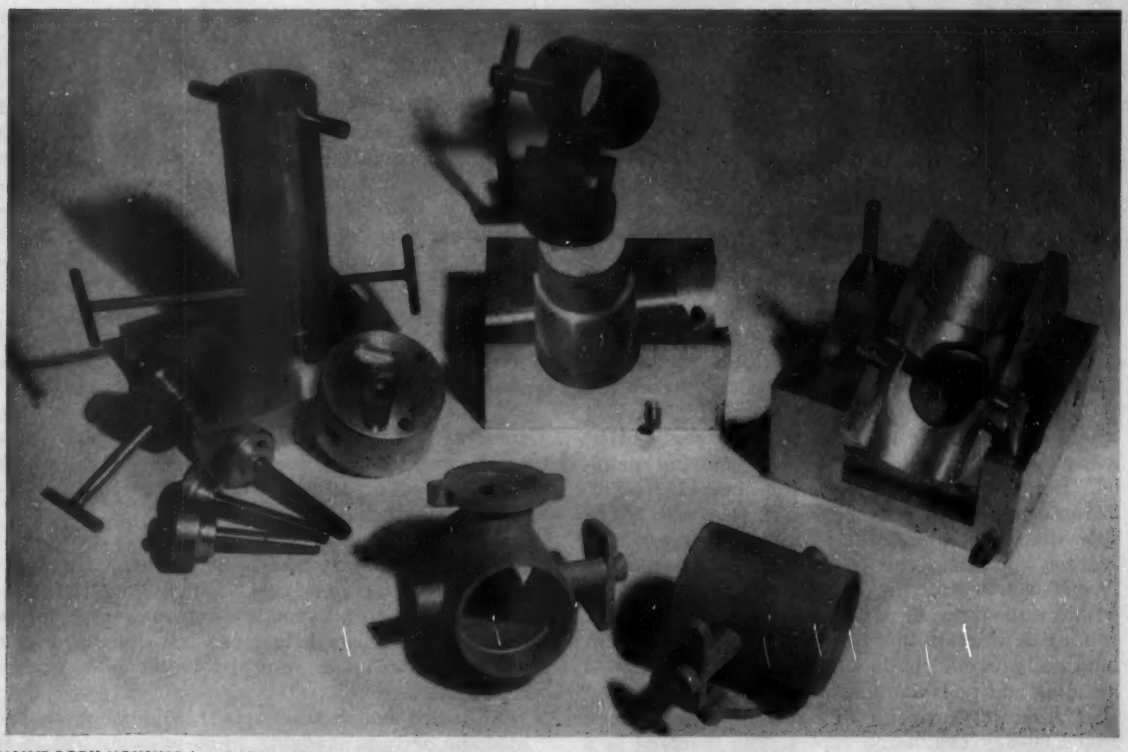


PUMP ROTOR CAST FROM "COLMONOY" contains chromium carbides and borides, and nickel matrix which combine to give this alloy excellent wearing qualities with minimum friction. Rotor as cast has hardness of R_c60, keyway is cast to size, and only machining is grinding and lapping ID and OD. Rotor is used in cement and sand sludger, which has been in daily use for past seven months without overhauling. Wax impression was made in two stages because large volume of material if poured in one stage would set up excessive shrinkage

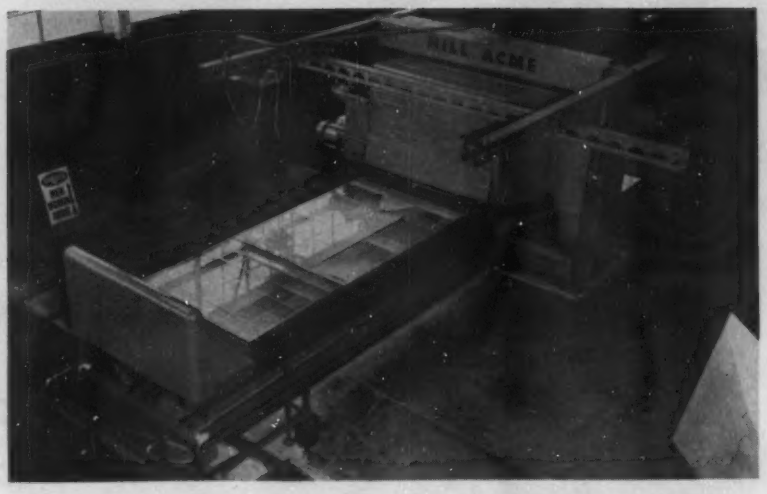




HELICAL AND SPROCKET GEAR poured from silicon brass, is used for operating "jalousie" windows. Helical gear rides in worm attached to window crankhandle, and sprocket drives two rods whose ends have machined spherical balls which mesh with sprocket. For limited production and functional tryout, wax impression was made in two pieces to economize on mold costs. Parts have recently been "proven out" and new mold is being built to make wax impression in one piece. Because arc of sprocket profile was greater than 180°, best method of casting parts was by investment. Sprocket and worm gear had to be concentric to each other within 0.005 in. TIR. Gear had 29 teeth, 14½° PA, 13° 29½' tooth angle, 1.523 in. PD and tooth depth of 0.114 in.



VALVE BODY HOUSING has 0.200-in.-dia hole 4 in. long cast in line within 0.005 in. over entire length in two planes. One plane 12° to base, other plane on vertical centerline. Castings are subject to 100% X-ray, surface finish averaged 70 mu in. rms, and rejects were less than 5%. To assure homogeneous castings, particularly in c'bored base, vacuum is pulled while investing with c'bore face up to avoid air pockets



BELT GRINDING MACHINE was built for Bell Aircraft under US Air Force contract. A 250 hp drive motor provides 3 hp per inch of belt width to remove metal at a rapid rate. Simplified belt changing, vacuum chuck, and equipment for close control provide a flexible and versatile machine—a far cry from the conventional belt sander used only for finishing

How abrasive-belt grinding improves taper

Tapered sheets, a recent innovation for greater aircraft efficiency, were at first thought to be impractical because of the high machining cost. Now, as a result of a US Air Force-sponsored project, they are entirely practical, when machined by abrasive belt methods. Success in making aluminum and stainless steel wing and fuselage skins brings contemplation of many other uses.

ndustry in general, and the aircraft industry in particular, will benefit greatly from the improved abrasive belt grinding techniques resulting from this program. We expect that all of the methods currently used such as taper milling and taper rolling, may be outstripped and outmoded by this new technique, which is more flexible and less complex. Not only is the abrasive-belt method of removing material more economical and faster than conventional methods of producing tapered sheets for aircraft but, in addition, the lower initial investment plus the savings in operation and maintenance are of major importance. This is not a simple sanding operation used only to finish part surfaces but is, rather, an accurate and fast metal-removing method. Using a 36-grit, silicon carbide belt, 280 cu in. of material is removed in 20 min. On these heavy cuts, the taper is held to a tolerance of ± 0.002 in. Lighter cuts, using an 80-grit belt and removing from 0.004 to 0.002 in. of material, prouced work within a tolerance of ± 0.001 in.

For this program, and Bell Hill-Acme Co of Cleveland designed and built a heavy-duty abrasive-belt grinding and polishing machine. They installed it at Bell Aircraft Corp and this article is based upon Bell's 60-day evaluation report. The machine is a hydraulic table-style grinder using an 86-in.-wide abrasive belt. Contained in a double housing, the grinder is powered by a 250-hp, dc motor. The positive hydraulic reciprocating-table drive of this machine permits instantly variable speeds. Equipped with a 36-grit silicon carbide abrasive belt, this machine is equally efficient for stock removal or for grinding or polishing to close tolerances with lighter-grit belts. Heavy grinding, as well as finishing, operations are performed by using abrasive belts made with waterproof cloth backing, together with a coolant. The "wet" process is necessary for two reasons:

1. During heavy grinding, heat is generated within the material and if the temperature increases beyond a certain point, unless the material is adequately cooled, serious distortion will occur.

2. Coolant at high pressure is directed against the abrasive belt to prevent "loading." The high pressure is required to force the coolant spray through the turbulent air at the surface of the rapidly moving abrasive belt.

Thus, coolant at very high pressure is directed at the point of contact between the material and the belt, to keep the stock cool at all times. Other nozzles are used to prevent loading, as well as in the coolant return trough to move the sludge into the filter. All coolant is returned to the filter and is recirculated.

A device which is standard equipment on the machine permits changing an 86-in.-wide belt in as little as 10 min. With this device it is a very simple matter to remove material at a fast rate with a coarse belt, then change to a finer belt for finishing.

Two motors control the vertical operation of the

OPERATIONAL ELEMENTS include vacuum chuck which can be used for any sheet shape because sectioned suction ports can be plugged in areas not covered by work, abrasive belt having grit size determined by job characteristics (metal removal rate and surface finish), and sprayheads to supply coolant at high pressure, both to prevent warpage and to keep belt from loading

sheet production

J R BURNS, supervisor, manufacturing research
BELL AIRCRAFT CORP, BUFFALO 5, NY

COOLANT, usually soluble oil and water solution, is sprayed at point of contact between work and belt; permits heavy cutting with excellent finish characteristics. Arm (upper center) is part of adjustable air-eye belt tracking device which allows use of very narrow belts as well as belts up to 86 in. wide, or slightly wider than the material being processed.

grinding-head assembly. A 3-hp, constant-speed motor, geared to the elevating screws, raises and lowers the entire head at 5 ipm and is used to rapidly position the abrasive belt over the work. Then a 1 hp geared motor, connected to the elevating screws by a magnetic clutch, is used for accurate positioning. It will slowly down-feed the belt into the work with settings as precise as 0.0005 in. A large indicator on the front of the machine accurately shows the depth of the cut being taken.

Incorporated in the entire work table is a vacuum chuck equipped with special gaskets to conform to our sheet shapes and sizes. For safety, a vacuum switch is interconnected with the abrasive-belt main-drive motor and the rapid traverse motor. If the chuck's holding power becomes reduced below a safe limit, the safety device stops the abrasive belt and raises the grinding head away from the work. Any portion of the vacuum chuck can be used at any time and the unused portion can be sealed off with small plugs. To produce either a single or a compound taper, the work table can be raised to any angle for right- as well as left-hand tapered sheets.

Machine setup, basically, consists of inserting the proper precision-ground blocks (shims) in their proper places beneath the work table. Then the rough trimmed sheet or plate is placed on the vacuum chuck gaskets. After positioning the highest part of the work under the contact roll, the main drive motor is started and the grinding head is lowered onto the sheet until light "sparking" appears or contact is made with the work surface. Next, the coolant is turned on and, after down-feeding the required amount, the table is reciprocated at the proper cutting feed.

In the grinding operation, the abrasive belt removes the stock to produce a tapered surface on a plane parallel with the contact roll. If a better finish is required, the belt is exchanged for one with finer grit when the piece is within 0.010 to 0.015 in. of the finished dimensions. Belt loading is negligible because the flexure of the belt over the rolls, plus

COOLANT RESERVOIR and filter system is below shop-floor level at one end of machine. Coolant runs off table into channels along each side of bed and is flushed into a filter-separator where it is thoroughly cleaned and recirculated. Sludge is removed from the separator by a continuously moving conveyor belt (left)

BELT CHANGER, plus simplified belt installation system, provides for rapid belt removal and replacement. Thus it is entirely practical to use a coarse-grit belt for roughing and then change to a finer-grit belt for finishing on even short-run jobs

the high-pressure coolant spray, tends to keep it clean. A 36-grit belt showed no signs of loading after removing, with heavy cuts, 830 pounds of aluminum.

To demonstrate grinding-belt strength, a new Carborundum 36-grit, silicon carbide belt was used to take cuts up to 84-in. wide and 0.140-in. deep at approximately 14 ipm. The full 250 hp was used for this heavy cut. Up to 165 cu. in. of aluminum, or 17 pounds, per min., was removed. Upon examination after these tests, the belt showed no signs of excessive grain breakdown and was used to rough-grind many more sheets. Further tests have shown that the belt cost is less than 10 cents per pound of material removed. In taking these heavy cuts with a 36-grit abrasive belt, considerable pressure is exerted on the sheet. At least 3 hp per inch of belt width is necessary for smooth, free cutting. The surface finish produced by this belt was from 200 to 250 mu-in. rms.

For finer finishes light cuts with an 80-grit belt produced from 130 to 150 mu-in. rms, without "sparking out." Still smoother surfaces require the use of even smaller-grit belts and spark-out after the finish-grind pass.

No warping or distortion resulted from heat generation when coolant was used. A very slight bow on the tip, or thin edge, of the sheet resulted from the release of cold-work stresses in the material, but this was definitely not considered detrimental to the piece.

The use of coolant has been definitely established relative to controlling heat distortion, rapid chip removal, and prevention of belt loading. After various tests of oils and water-soluble coolants, etc, the most satisfactory coolant thus far is Hi-Lo No. 4, a water-soluble oil. Purchased as a concentrate, this oil is diluted in a ratio of from 75 to 100 parts of water to one part of oil.

Floor-to-floor time required to produce individual aluminum tapered sections by this grinding method is conservatively estimated to be 50% below that of conventional skin milling, and subsequent operations of polishing aluminum as smooth as 10 mu-in. rms are readily accomplished with fine-grit belts.

American Machinist

SPECIAL REPORT
NUMBER 380

How to form integrally stiffened skins

W T KLUGE, group leader — fabrication group, production development laboratory, NORTH AMERICAN AVIATION, LOS ANGELES, CALIF.

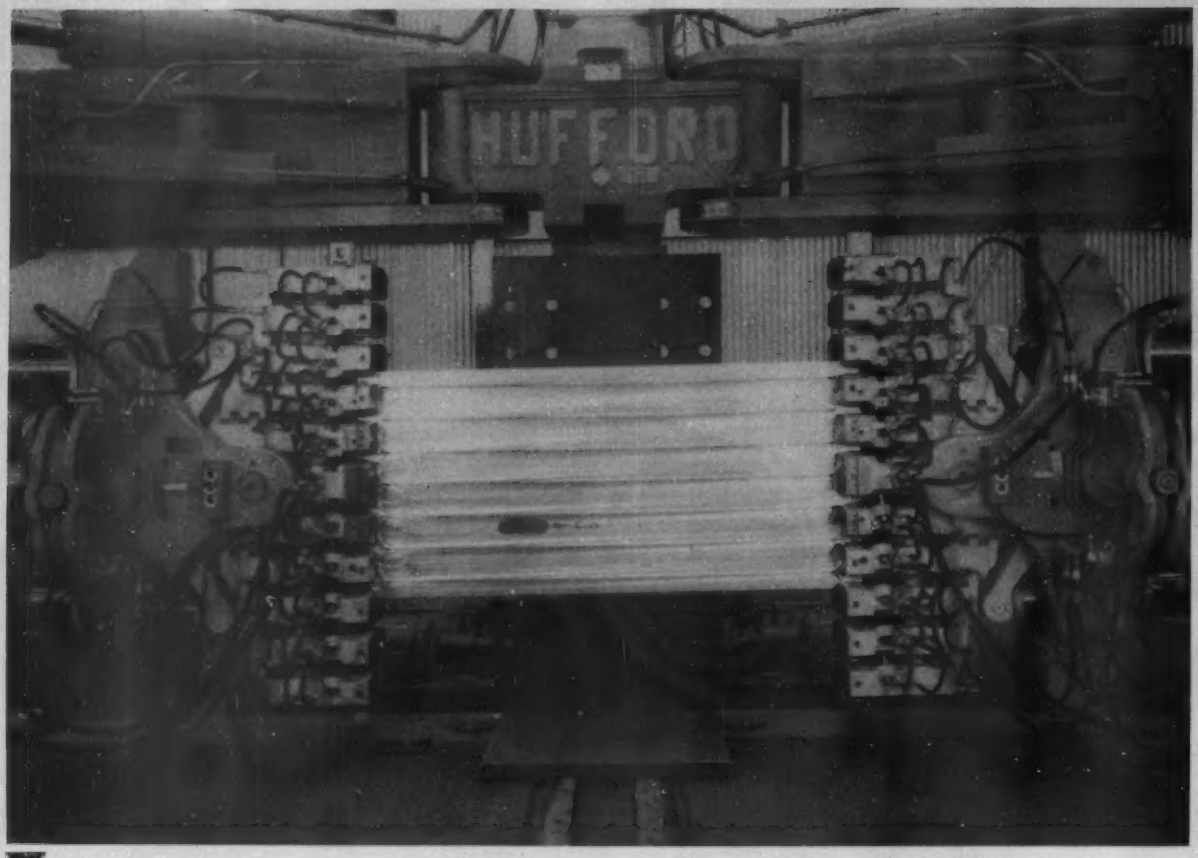
AIRCRAFT structures have developed from a thin skin supported by many thin ribs into a wing surface an inch or more thick with heavy integral ribs to provide the stiffness required for supersonic flight.

Each aircraft company has developed individual types of structure that become heavier and larger with each succeeding model. To form these integral skins has required adaptations in previous methods and the development of entirely new methods.

Current practice of the industry as a whole has been summarized previously (Production Problems on Supersonic Planes, AM—Jul 5, 54, p129). This report describes in detail the six variations in method to suit different designs that are used at North American.

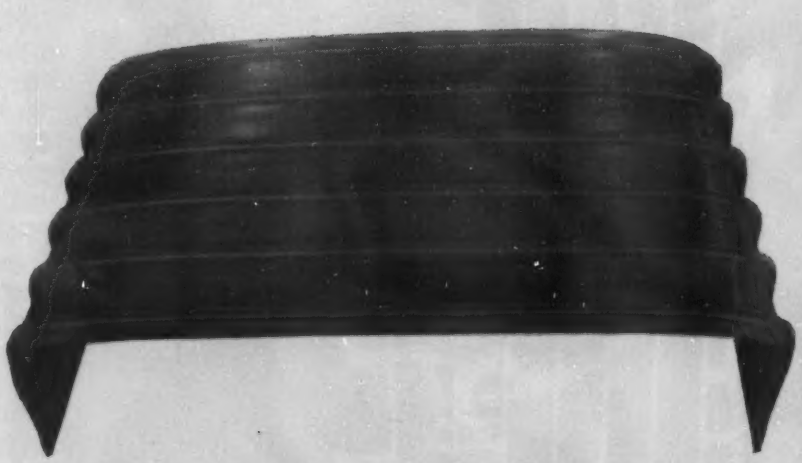
Some designs are formed by conventional stretch forming (sometimes modified with special clamping devices) but other structures have required the development of such new methods as form-die quenching (sometimes modified with high-pressure fluid injection or with metallic shot as one die) and pre-stress hot forming. Both form-die quenching and pre-stress hot forming are covered by various patent applications with licenses available from the Patent Section of North American Aircraft.

COPYRIGHT 1954 BY McGRAW-HILL PUBLISHING CO. INC. 330 W 42nd ST. N. Y. 36, N. Y.

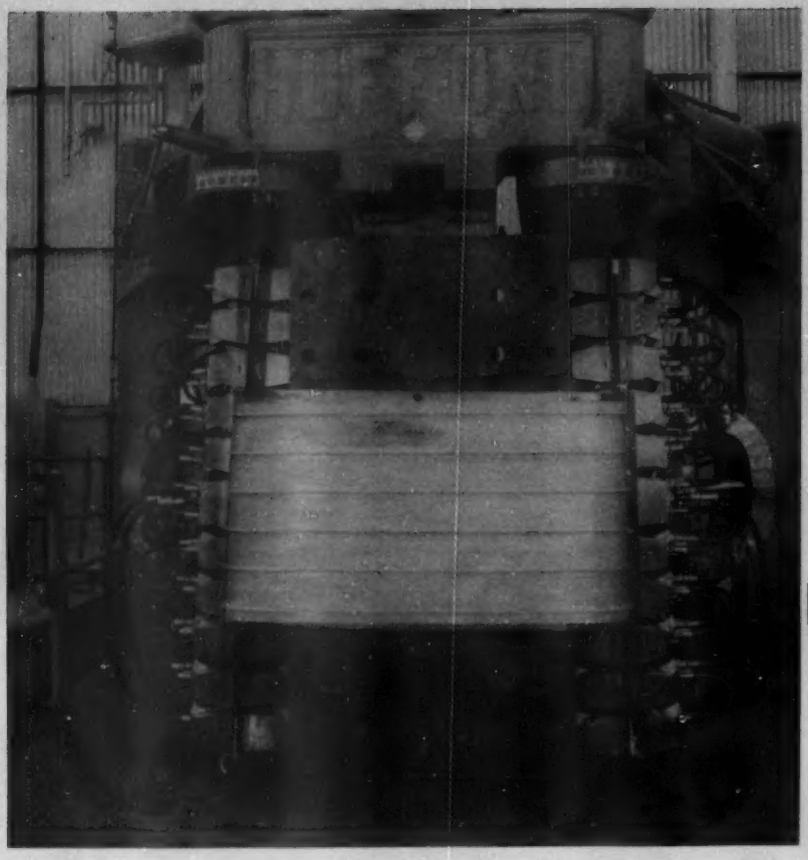


INTEGRAL-STIFFENED DUCT SKIN of uniform cross section in the jaws of a 150-ton Hufford stretch-wrap forming machine prior to forming. The skin is machined from 1-in., 75S-T6 (AA 7075-T6) aluminum plate with a skin thickness of 0.040 in. and a land running along one side 0.072 in. thick. Integral stiffening ribs 3/16 in. thick and the full 1-in. plate thickness high run the length of the part to the ¼-in. land on each end for the stretcher jaws to grip. The over-all blank size is 30 x 72.

Stretch forming adapted to



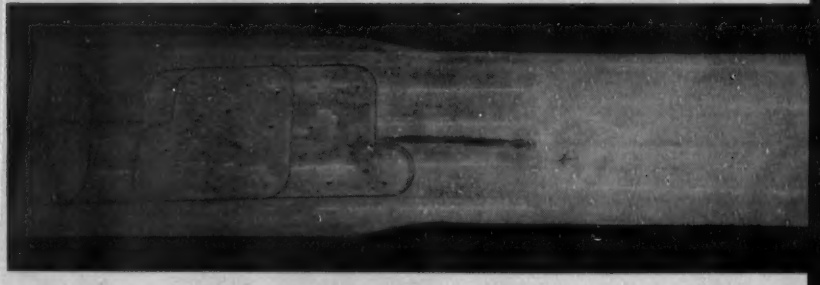
FINAL CONTOUR BEFORE TRIMMING. Finished part is trimmed and precipitation aged to the 75S-T6 (AA 7075-T6) condition. One problem in stretch forming integral-stiffened parts with high ribs is that lateral movement of the stiffeners cannot be controlled. Some work is thus required. Stretch forming is generally limited to parts ⅛ in. thick with relatively uniform cross section in the direction the part is to be stretched

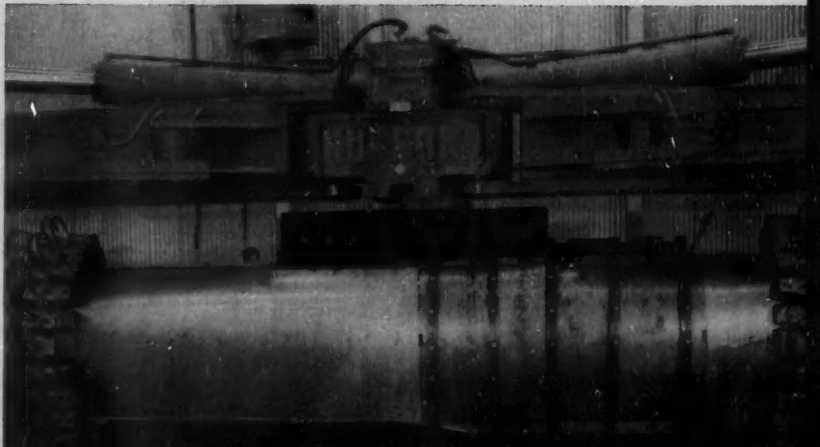


PART IS STRETCHED AND WRAPPED simultaneously to the finish contour while in the "Q" or "as quenched" condition. Immediately after heating and quenching, heat-treatable aluminum alloys are soft until natural aging has had time to occur. The effect of natural aging is appreciable after one hour at room temperature, but may be retarded by holding the aluminum under refrigeration at 5 to 32 F. After the wrapping is completed, the major load is applied to set the part to the die

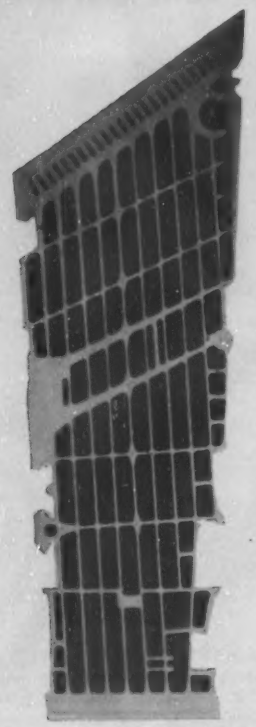
integral skins

Special clamping device handles sculptured skins

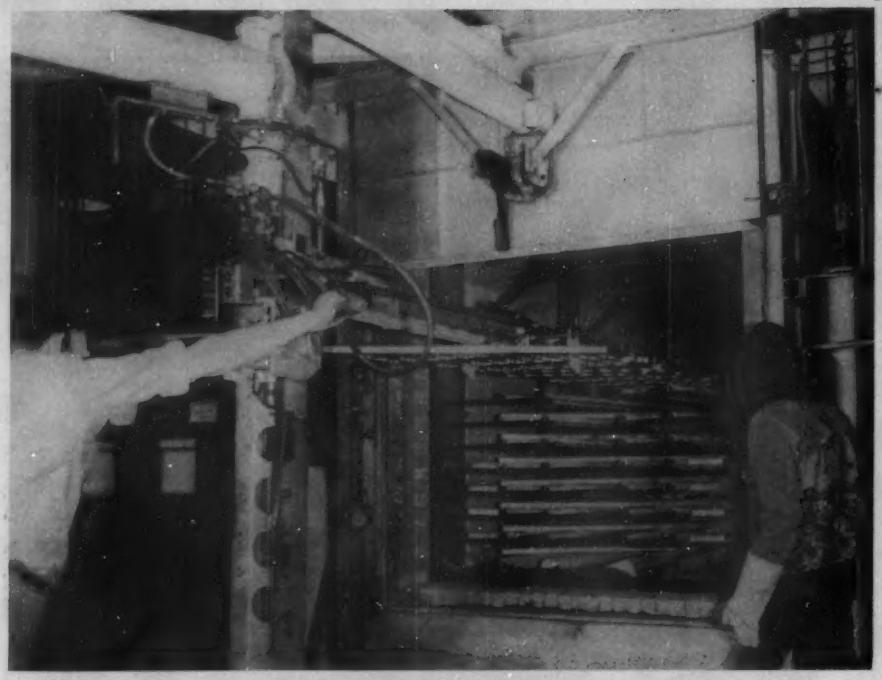




SCULPTURED SKIN adapted to stretch forming (top right) is machined from ½ in., 75S-T6 sheet to 0.096 and 0.072 in. in certain areas. The part is heat treated and stretched in the "Q" condition on a 150-ton stretch-wrap forming machine. The cross section is kept constant by leaving the material wider adjacent to sculptured areas. Clamping device to hold sculptured areas snug to die prevents buckling and necking. It consists of straps over sheet-metal cover that hooks into backing plate of machine. Adjustable screws in straps allow sheet-metal plate to be adjusted to exact tightness against the skin. Rubber pad glued inside prevents scratching of skin



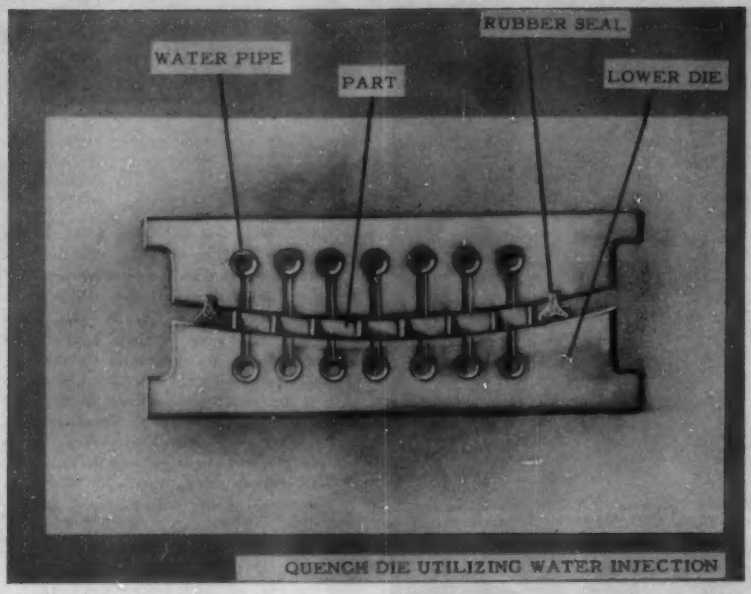
ONE OF THE LARGEST GRIDS now formed is 116 in. long by 40 in. wide and weighs 100 lb. Such grids in the wings of the F-86H Sabre and FJ-2 Fury present a new fabricating problem. A 1-in. aluminum alloy plate has blocks routed out leaving bars in the form of a grid. The pattern of 1-in. bars must be accurately formed to the mold line contour as it is covered on one or both sides with an aluminum skin, one side forming the outside surface of the aircraft. Various conventional methods of forming were tried on this type of structure, such as power-brake forming, progressive-die forming, and forming on ships rolls. These methods were time consuming, and did not produce uniform parts or the accuracy desired as they are all cold-forming methods affected by springback. A method combining hot forming, heat-treatment, and stretching while hot to eliminate distortion and springback is form-die quenching. The machined part is heated for the normal heat-treating cycle, then rapidly transferred to mated Kirksite dies (similar to drop-hammer dies) mounted in a hydraulic press



A NUMBER OF GRIDS are placed in an aluminum heat-treating oven, brought up to the heat-treat temperature, and soaked together. Handling device to move the grids from the oven has air cylinder that raises and lowers the loading arm to pick up top grid remaining in the oven. During travel to the furnace, this loading arm is lowered to position to just clear bottom die in press

Form-die quenching applied to

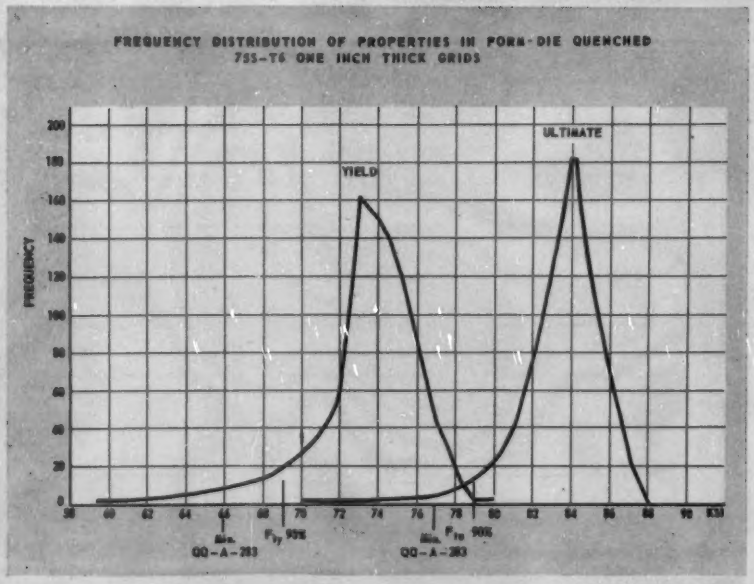
GRID IS PLACED ON LOWER DIE and fingers supporting the part are electrically released. The grid is automatically positioned by blocks provided around the lower die member. The loading arm is rapidly withdrawn from the press and dies are immediately closed on the part with maximum pressure built up as rapidly as possible, forming the hot part to the contour of the dies. The part is quenched by conduction of heat from the part into the large mass of dies. A minimum pressure must be maintained on each part during the cooling cycle to restrain the part from contracting. The part expands as a result of being heated to 920 F for heat treatment and the natural contraction during quench is restrained to secure stretching and growth of the part in all directions. The stretching is necessary to eliminate distortion from quenching stresses by producing a part with low uniform residual stresses



DIES FOR WATER-INJECTION form-die quenching (shown with the dies closed on a grid) increase the quenching rate and keep the Kirksite dies cool during a production run. Grids are constructed with a plumbing system to circulate water from the lower die through the openings in the part and out through the upper die. With this type of die, and six to twelve parts heated in an oven at one time, a part can be form-die quenched every 15 min.

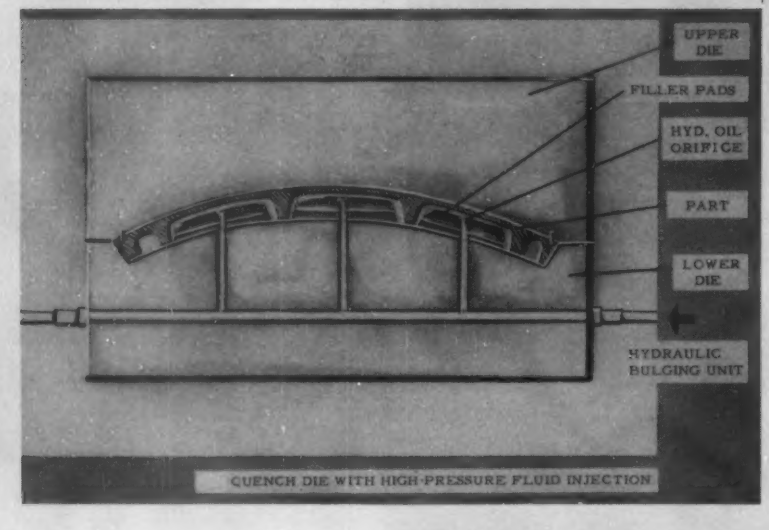
FINISHED CONTOUR OF WING GRID lies snug to the die after form-die quenching. Maximum height of arc is approximately ¾ in. Guide blocks can be seen on the lower die. Several thousand grids have been form-die quenched to date

large grids



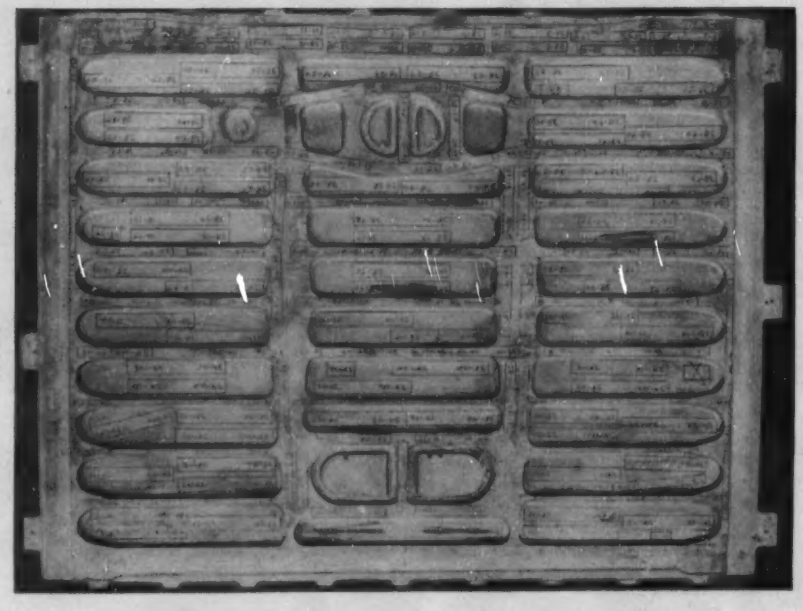
FREQUENCY DISTRIBUTION OF TENSILE PROPERTIES of five different form-die quenched 75S-T6 grids run without impact on which a total of 729 test bars were pulled. Distribution is unsymmetrical to the low side. 90% of the values are well above required minimums and meet the 90% expected values of normally heat-treated material in the transverse direction as given in ANC-5. Only 3.3% of the yield strengths and 2.4% of the ultimate tensile strengths were below required minimums. Low values result from areas not in intimate contact with the dies (caused by tolerances in part and dies). With the use of higher press pressures and impact, high areas are forged out and perfect contact is secured. The pressure must be limited to avoid excessive forging

GRIDS WITH AN INTEGRAL SKIN on one side cannot be form-die quenched in water-injection dies. They can be quenched without water injection but the skin areas buckle and wrinkle. The thin-skin areas cool more rapidly than the heavier grid material but are restrained by the surrounding heavy structure. After quenching, and the resulting shrinkage of the grid bars, the skin is too large. To correct this, hydraulic fluid under high pressure is introduced into the sculptured areas during form-die quenching, to force the skin areas against the upper die

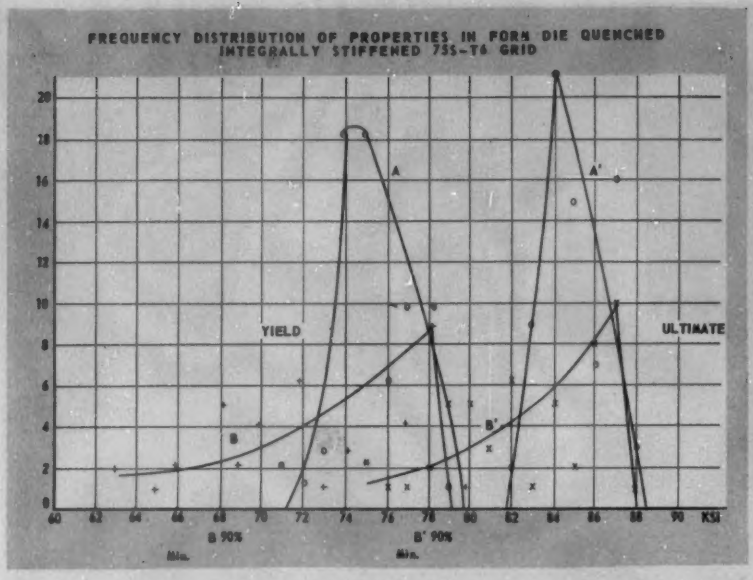


Fluid injection

HYDRAULIC OIL AT 8 TO 10,000 PSI, secured with a Sprague booster, is forced into the die after closing on the part. The cavities of the part are filled with blocks fitted loosely to the part contour to limit the volume of oil required and thus reduce the time to secure maximum fluid pressure

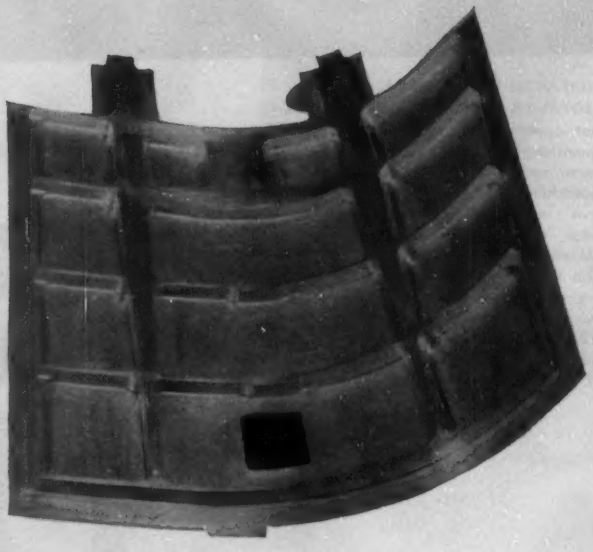


TYPICAL QUALITY-CONTROL LAYOUT of integral-skin grid. Tensile bars are cut from areas indicated. Part is 54 in. wide by 60 in. long, machined from 1 in. thick 75S-T6 plate with ⅛ in. thick skin



FREQUENCY DISTRIBUTION OF TENSILE PROPERTIES for two parts formed with (A) and without (B) impact on a 7000-ton hydraulic press. Because of integral skin it is difficult to maintain properties without impact. Higher and more uniform properties are secured with impact. The low properties shown are all in the skin area

flattens skin area

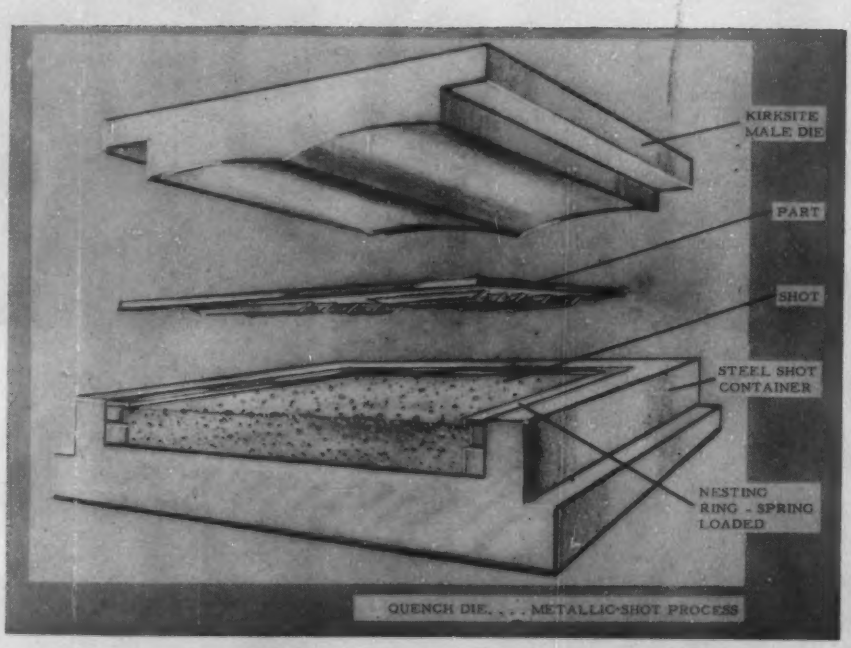


SEVERE CONTOUR OF PART machined from ⅞ in. 75S-T6 makes a preforming operation necessary. The skin is 0.040 to 0.050 in. thick. Part is hot formed on the dies with the filler blocks removed, stretching the skin areas. The lead filler blocks are fastened to the die for form-die quenching and skin areas are formed out against the top die with hydraulic pressure

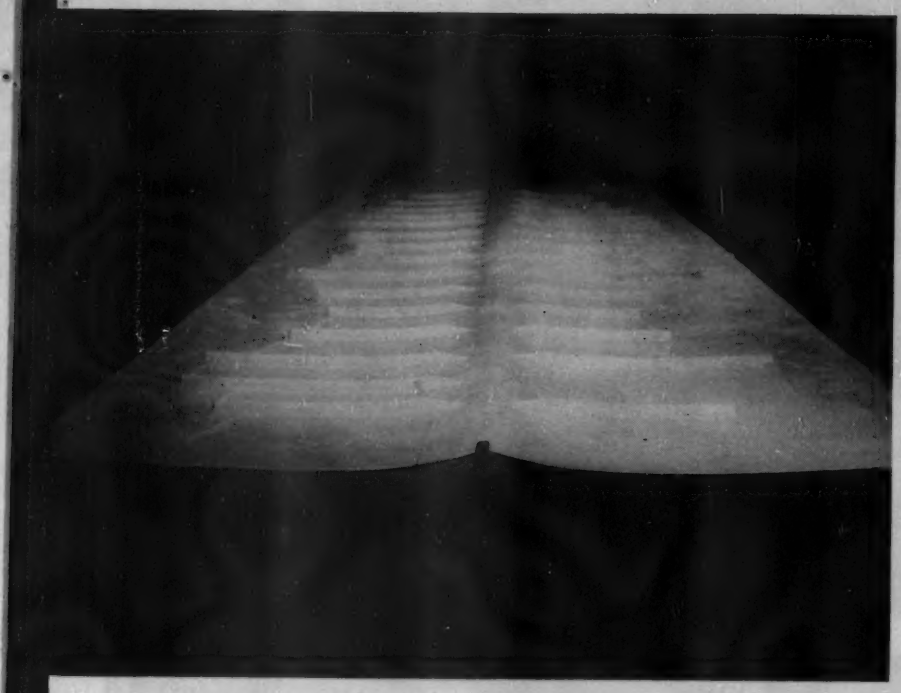
OUTSIDE OF THE PART, after form-die quenching shows outline of the integral stiffeners. Sanding the surface will eliminate this outline

THIN SKINS WITH HIGH INTEGRAL-RIB STIFFENERS are not applicable to form-die quenching in mated dies. To form such parts, form-die quenching in metallic shot was developed. Leading edge shown here is machined from ⅞-in. plate. The skin thickness after machining varies from 0.064 to ¼ in. and the ribs vary from 0.040 to 0.064 inch. The blank size is 48 by 128-5/16 in.

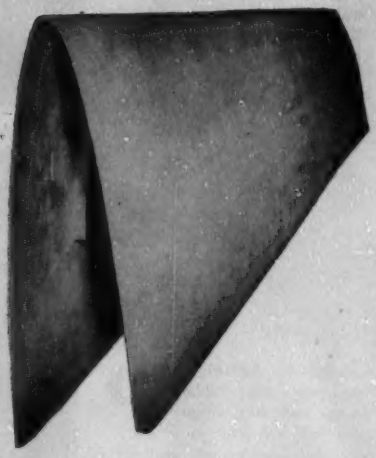
Metallic shot



DIE ARRANGEMENT for metallic-shot form-die quenching. A cast Kirksite punch with the desired contour is the upper member and a rectangular steel container filled with shot the lower member. The part lies on the nesting ring to seal in the shot. The air in the shot blows the fine particles out of the container if they are not sealed in. Shot that gets on top of the part is forced into it by the die. Parts must be cleaned after forming to remove any shot adhering to the part. The part is machined undersize to a shrink scale as in normal form-die quenching but the scale is slightly less than with mated dies

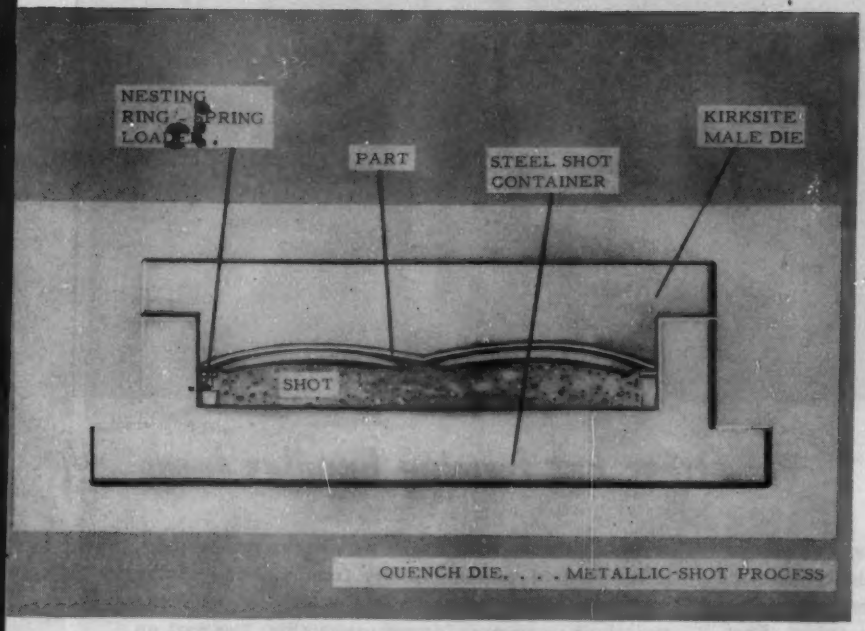


CONTOUR OF LEADING EDGE after completion of the metallic-shot form-die quenching operation. No difficulty is experienced with lateral movement of the ribs as in stretch forming. The same true contour to the die surface results from metallic-shot form-die quenching as with mated dies



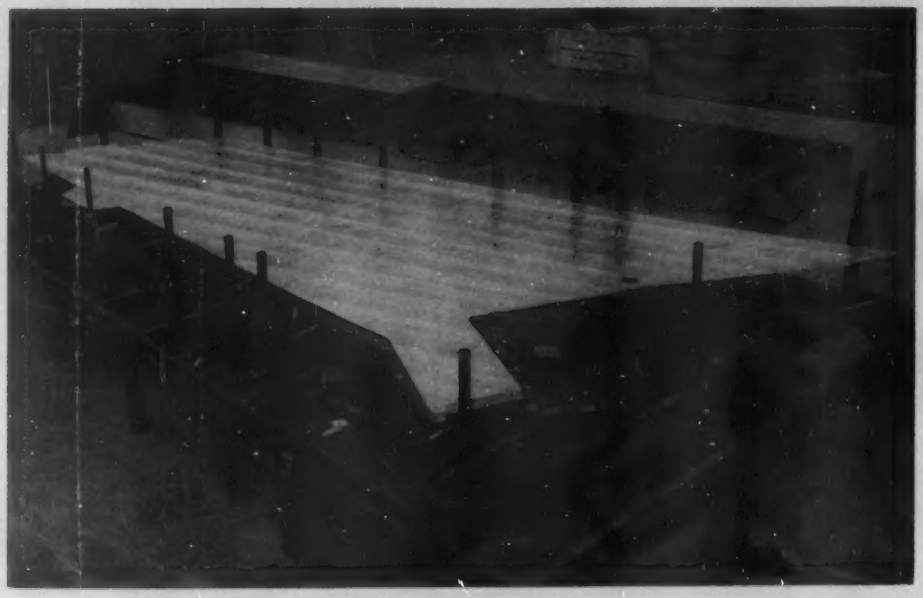
LEADING EDGE IS COMPLETED by a brake-forming operation to position the two contour halves

can serve as one die



DIES IN CLOSED POSITION with shot and part conforming to the upper die. The upper die determines the contour of the part while the shot acts as a fluid to force the part against the upper die and support the integral ribs

AN OVER-CONTOURED JIG must be developed for each part, sufficiently rigid to restrain the part. Here a typical part is on the pre-stress jig before clamping. Two jigs and quenching units are used in conjunction with a two-zone circulating oven



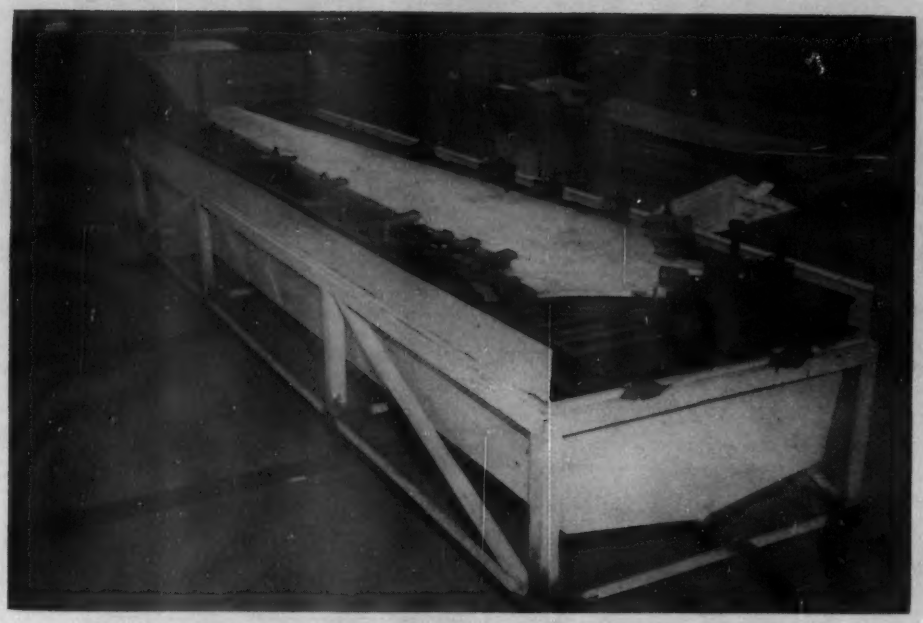
LARGER WING SKIN requiring more contour requires a pre-stress jig made in two halves

Pre-stress hot forming handles large

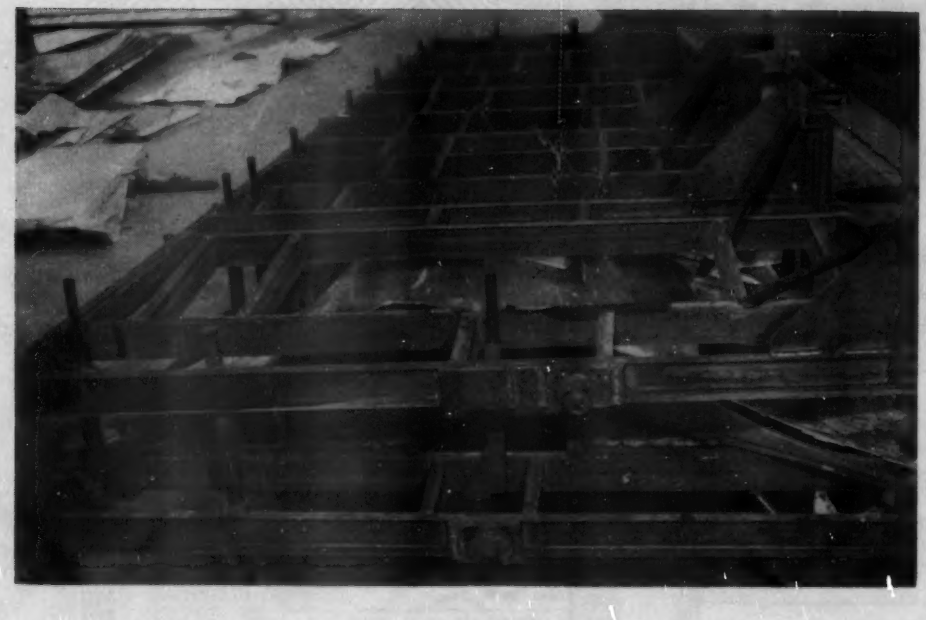
For large sculptured and integrally stiffened aluminum alloy parts requiring slight or moderate contouring, form die quenching is not applicable because of the size of the equipment that would be required. Shot peening is applicable to some parts, but is not effective on heavy pads or attaching sections which may be an inch or more thick. A new process developed by North American Aviation named "pre-stress hot forming" has shown considerable success in the forming of large integrally stiffened wing panels with heavy root sections.

The desired contour results from yielding of the material at elevated temperatures induced by being restrained in an over-formed contour jig. The part on the jig in the over-contoured condition is placed in an oven. After it is removed from the oven and taken off the jig, the part springs back to the required contour.

Yield strength of aluminum alloys, particularly 75S, decreases rapidly with increasing temperature. Thus



PART IS CLAMPED DOWN to the developed jig by bolts all around the periphery. Four lead thermocouples are attached to the part and the metal temperature is recorded on a four-point temperature recorder. The pre-stressed part on the jig is rolled on tracks from the quenching unit into the oven



TWO HALVES OF JIG are assembled with the part horizontal and then set on a track with the part vertical for rolling into the furnace. Lead couples are attached to the part as previously. After the heating cycle, the jig and part are rolled out of the oven and quenched by spraying water on all sides of the jig. Integrally stiffened, sculptured wing skins 1¼ to 1⅞ in. thick and as large as 100 x 210 in. in maximum dimensions are formed in production

parts

elastic stresses induced in the part at room temperature will be above the yield strength at elevated temperatures and plastic deformation will occur.

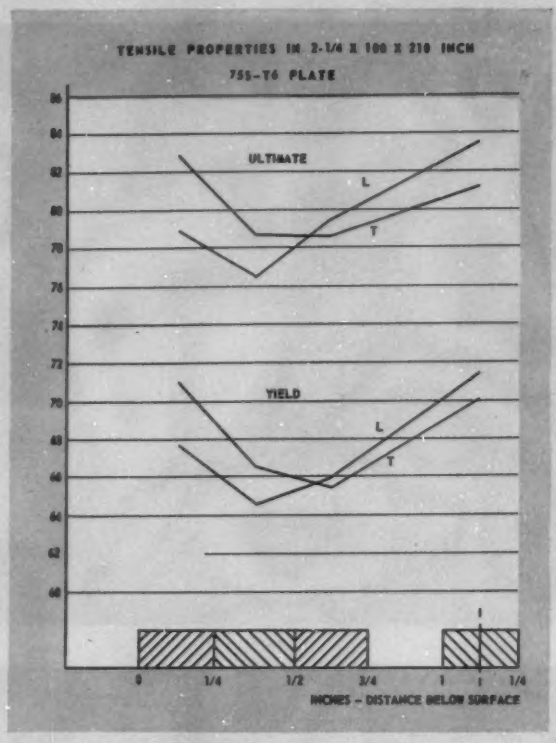
Program controllers control the temperature in the furnace at the heavy and light ends of the part to bring them up to the soaking temperature as rapidly as possible yet have both arrive at the soak temperature at the same time. The jig and part are rolled out of the oven onto the quenching fixture and water immediately sprayed onto the jig and concave side of the part. The quenching rapidly cools the part and jig for handling and limits the time at elevated temperature of the part. Some benefit is indicated by quenching only on the concave side.

The warpage or contour the part may have after machining influence the results obtained from prestress hot forming. With experienced personnel, this may be compensated for.

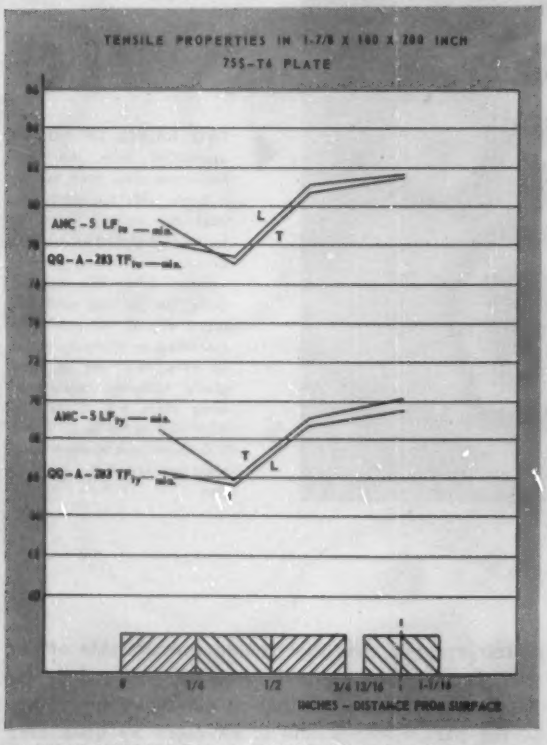
Properties of thick 75S-T6 plate

The mechanical properties of 75S-T6 aluminum alloy plate one inch and over in thickness show a variation with depth below the surface. Certain trends are apparent.

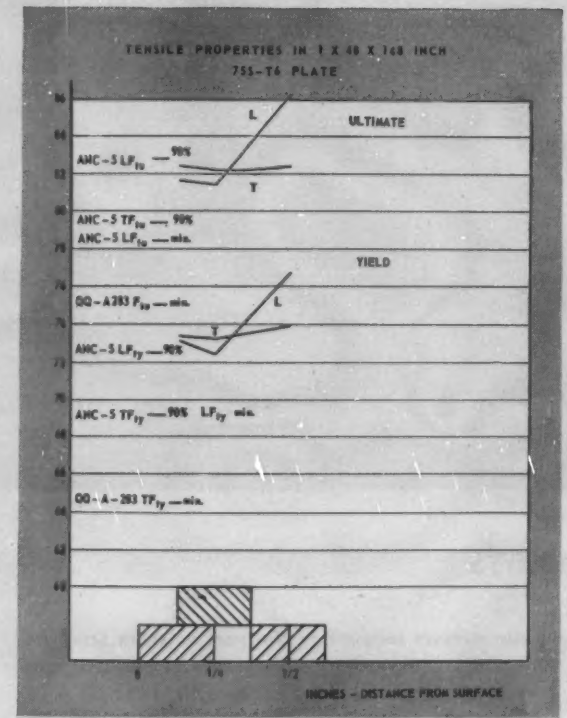
1. **The properties at the surface are lower than at the center of the plate.**
2. **Immediately below the surface is a region of lower physical properties which shows a greater difference as plate thickness increases.**
3. **The longitudinal properties are generally higher than the transverse at the center of the plate while the opposite is true at the surface.**



TENSILE PROPERTIES OF 2¼ X 100 X 210 IN. 75S-T6 plate are average properties for five locations in three different plates. All tensile bars were machined to ¼ in. thick with a ½ in. wide, 2 in. long gage section. The location of the test bars with respect to the surface of the plate is shown on the abscissa. Tensile properties are plotted at the center of the bar represented. This is the heaviest plate examined and shows the greatest loss in properties between surface and center


TENSILE PROPERTIES IN 1-7/8 X 100 X 200 INCH
75S-T6 PLATE
AMC – 5 LF$_{tu}$ — min.
QQ – A – 283 TF$_{tu}$ — min.
AMC – 5 LF$_{ty}$ — min.
QQ – A – 283 TF$_{ty}$ — min.
L
T
INCHES – DISTANCE FROM SURFACE

TENSILE PROPERTIES of 1⅞ X 100 X 200 IN. 75S-T6 plate, are average properties for 15 locations from a single plate. Again all test bars were ¼ in. thick with a standard 2 in. long gage section ½ in. wide. Loss in properties between surface and center is not as great as in the heavier plate. The longitudinal and transverse properties follow one another very closely with the center of the plate having higher properties than the surface in both directions


TENSILE PROPERTIES IN 1 X 48 X 148 INCH
75S-T6 PLATE
ULTIMATE
AMC – 5 LF$_{tu}$ — 90%
AMC – 5 TF$_{tu}$ — 90%
AMC – 5 LF$_{tu}$ — min.
YIELD
QQ – A 283 F$_{ty}$ — min.
AMC – 5 LF$_{ty}$ — 90%
AMC – 5 TF$_{ty}$ — 90% LF$_{ty}$ min.
QQ – A – 283 TF$_{ty}$ — min.
L
T
INCHES – DISTANCE FROM SURFACE

TENSILE PROPERTIES FOR 1 X 48 X 148 IN. 75S-T6 PLATE, are the average of one location from six different plates. The longitudinal properties at the center are appreciably higher than in the transverse direction, as it true of sheet stock, but at the surface there is little directionality. The properties in the transverse direction show little change with distance from the surface while the longitudinal properties increase approximately 5% from the surface to the center

Pneumatically powered roll ...

forms aircraft C-flange by ...

Hand forming—machine style

NORMAN L WHIPPLE, production processor, DOUGLAS AIRCRAFT CO, SANTA MONICA, CALIF

Latest step in the continuing effort to eliminate the space and personnel required for hand forming is the Brady forming machine. Operating on air pressure drawn from normal shop lines, it exerts 2 tons pressure on the clamp and 3 tons on the roller. Primary application is to eliminate the hand forming of C-flanges.

Conceived and developed within the framework of the Douglas suggestion plan, the machine is the work of Lyndon Brady (shown operating the machine in the pictures), a sheet metal bench leadman at the Santa Monica plant.*

Effect of the Brady machine is to eliminate either the second-operation form block or one half of a combination form block, tooling accessories, storage, transportation; increase utilization of presses as well as reduce time spent on hand forming.

About 300 different jobs are regularly handled on the Brady former at Douglas Santa Monica. The average saving in hand-forming time is 12 min, but one operation was reduced from 60 min to 5 min.

In some cases it has been found possible to form contour in a part by clamping action, then turn and shrink the flange with the roller. Jaws to provide various clamping actions can be developed and several are shown in racks on side of the machine.

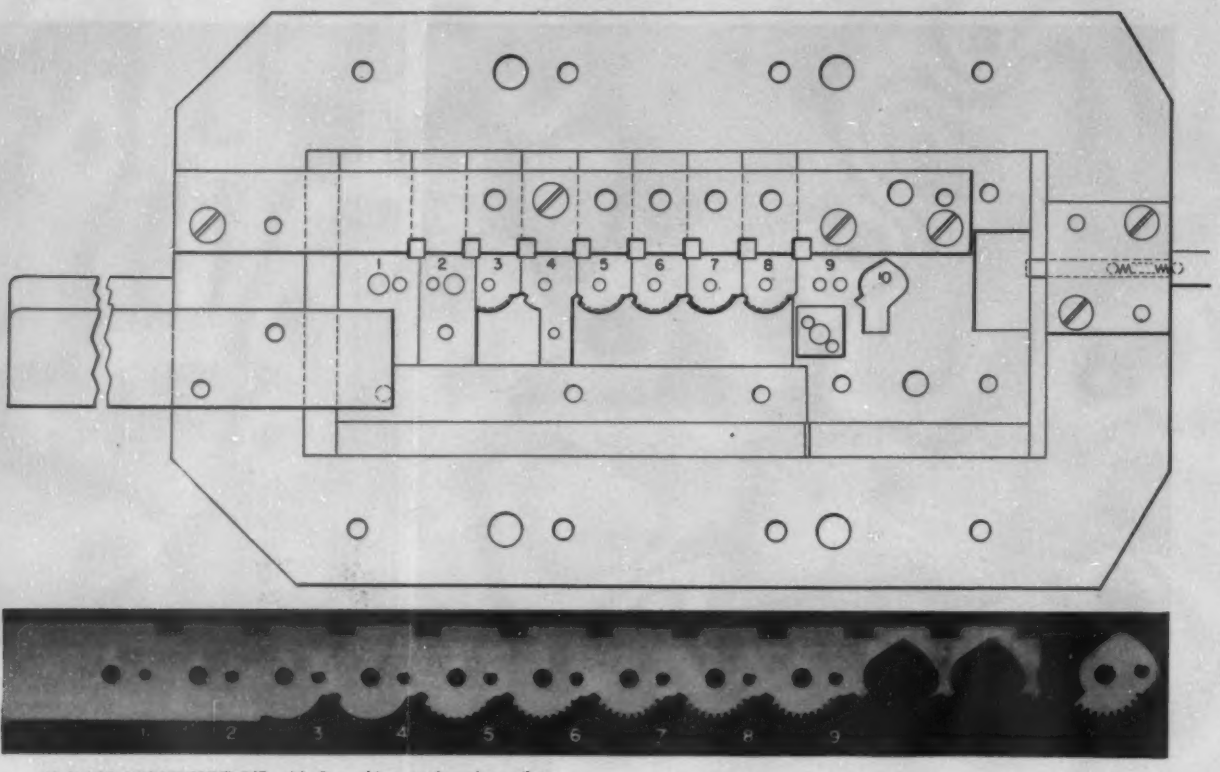
Experience with the Brady former indicates that it can form compound contour flanges in one plane, but not in two or more planes. The minimum radius of curvature on concave curves is 20 in.; on convex, 6 in. The main flange height is found to be a minimum of ¼ in. and a maximum of 2 in. Some of these limitations could be altered by minor variations in the design.

Form blocks for the rolling of C-flanges require a width 1 in. greater than the width of the flange. For channels that are less than 2 in. wide, the form block is made to fill the inside of the part and split longitudinally to facilitate removal.

C-FLANGE HEIGHTS FOR VARIOUS MATERIALS

	Aluminum		Stainless		Cr Mn Steel
Temper	0	T	Ann	1/4H	N
Maximum gage, in.	0.091	0.064	0.064	0.032	0.064
Minimum C-flange, in.	1/2	5/16	5/16	1/4	5/16
Maximum C-flange, in.	3/4	1/2	1/2	1/2	1/2

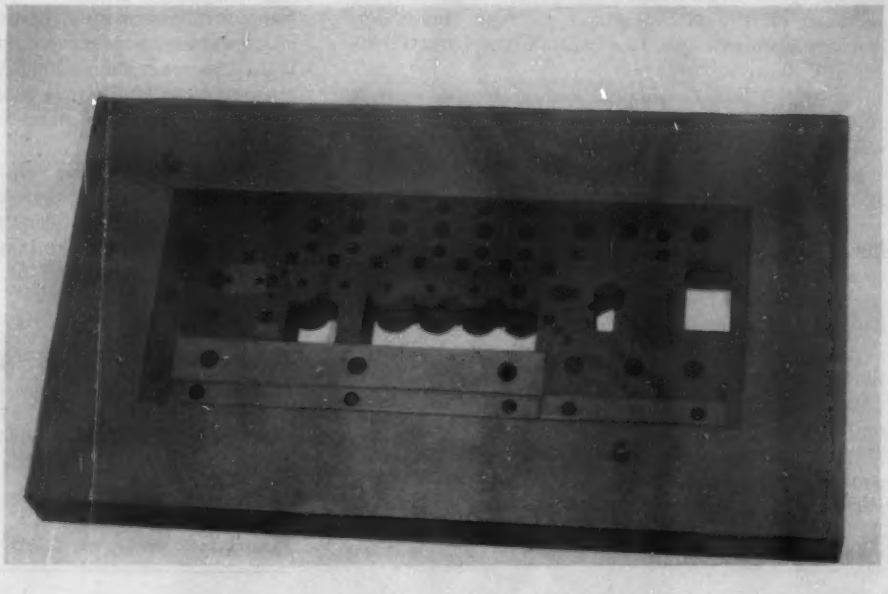
* *Machine was built for Douglas under license by Calstate Engineering Service, Los Angeles, Calif.*



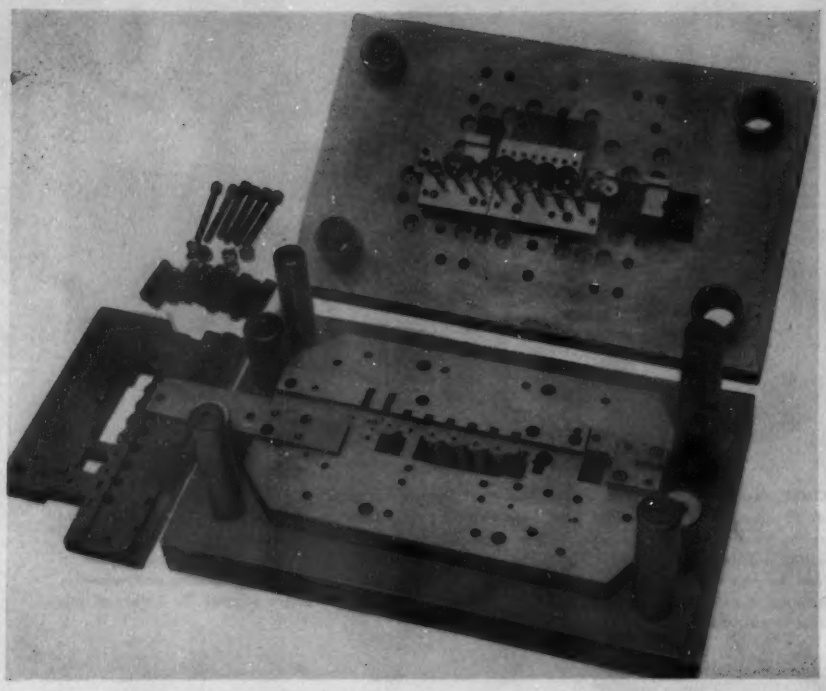
10-STAGE PROGRESSIVE DIE with 9 working stations has piloting and indexing controlled by master slots. Here's the sequence of operations performed at each station:

1. Pierce two holes and notch strip edge for pilot. 2. C'trsink both sides of holes. 3. First trim on profile and corner notch. 4. Dummy station. 5. First trim on gear teeth. 6.-9. Shave and relieve gear teeth. Final shaving station removes 0.003 in. of stock. 10. Blank gear and trim scrap from strip

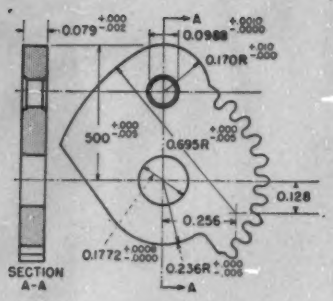
Sound tooling



EACH STATION of die is an individual section with piercing, piloting and dowel holes ground in jig grinder. This technique provides ease of manufacture and interchangeability for replacement of die sections. Clearance between punch and die was held to 0.0004 in. max.



DIE was run in a 20-ton Bliss press and blanked out brass material, 3/4 hard. Area of gear blanks had to be flat within 0.003 in. Note eight rectangular pilots and master slots used for controlling indexing of strip. Large rectangular opening to right of number 10 station is used for cutting up stock strip into scrap

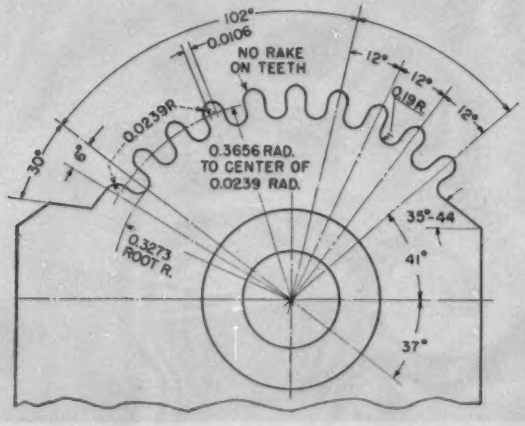


CENTRIFUGAL GEAR with 9 teeth (30 teeth in complete circle) called for tooth profile, tooth spacing and concentricity between dia of 0.1772-in. hole and pitch dia to be within ±0.0005 in. Surface of gear-tooth profile called for was 45 mu in. rms max, and center-to-center tolerance between two holes was held to ±0.0001 in.

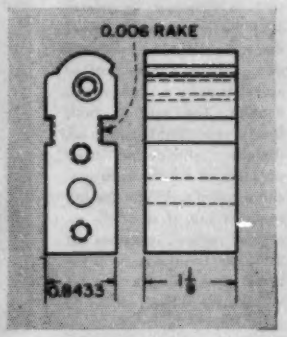
simplifies tough progressive die

Complex dies can be fabricated with ease and minimum handwork when properly tooled. Moore turned out this 10-stage progressive die, for a centrifugal gear, by performing 95% of the intricate operations on machine tools

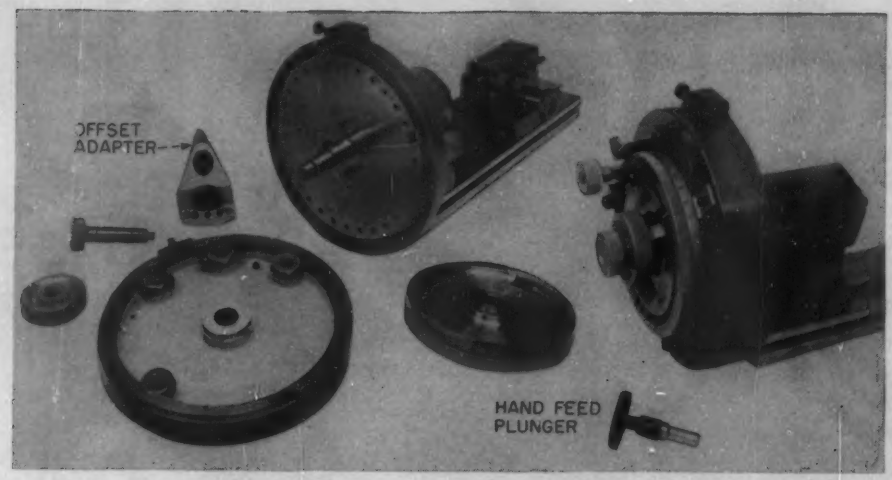
JAMES BROWN, chief tool engineer, MOORE SPECIAL TOOL CO, INC, BRIDGEPORT, CONN



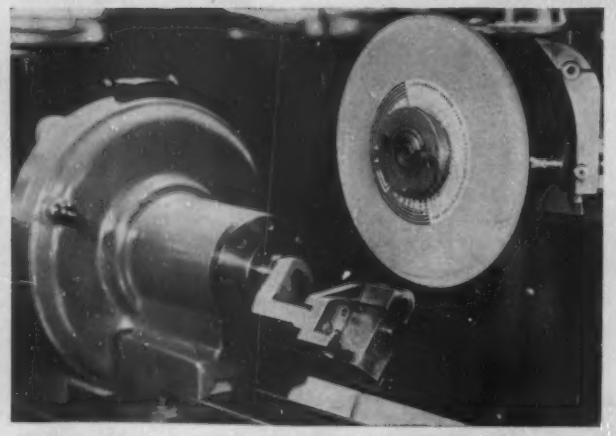
FEMALE DIE SECTION for station number 8. Material was high-carbon, high-chrome steel (TRIMO). Gear teeth were ground from solid section and required no handfinishing. Center hole and tooth profile had to be within dimensional tolerances for their full length



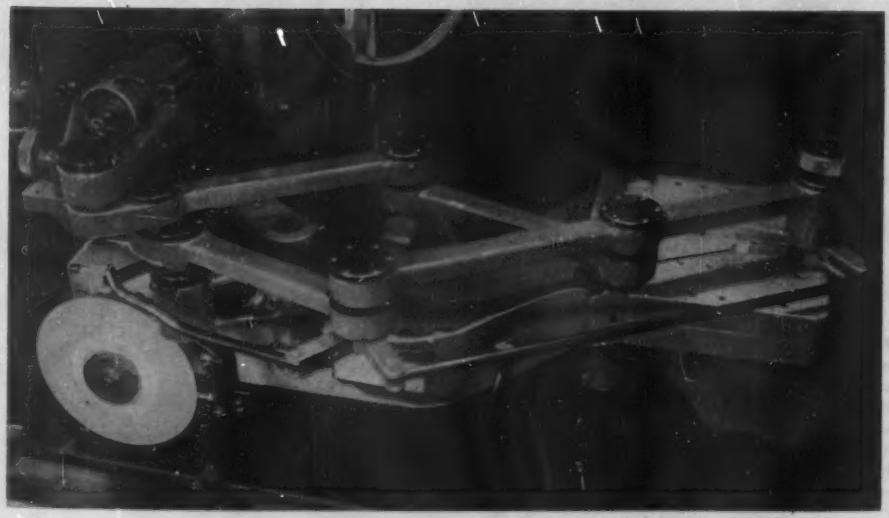
Progressive Die . . .
continued



INDEXING FIXTURE designed by Moore for grinding gear teeth in die sections. Adapter mounted in headstock spindle is offset to accommodate range of gear sizes. Workholding plate is in turn mounted to adapter to bring workpiece on centerline. Carbide plunger pin slip-fits into carbide bushings, and has a slow tapered pilot for providing positive locating in index plate. Hand feed plunger is equipped with rubber sleeve to provide fine feed by working against knurled section of graduated plate. Rapid rough spacing and reference to indexing positions is provided by plate graduated in increments of 1°. Stops located in T-slot of this same plate makes it possible to rock workpiece while grinding



GRINDER, equipped with a Moore Panto-Crush, dresses a 6-in.-dia wheel with full profile of gear tooth, tracing from a 10:1 templet. True profile of gear tooth is ground on full length of die section. At finish grind, where relief on teeth is required, such as on small pinions, only one-half of gear profile is ground at a time to provide relief at root diameter. Workpiece is centered to wheel profile by taking a single roughing cut, inserting a wire in cut, indexing work 90° and taking an indicator reading. Work is then indexed 180° and reading over wire is checked. Any error can be compensated by transverse leadscrew



FIVE DIFFERENT MAKES of surface grinders accommodate the Panto-Crush wheel dresser without modification, while three other makes require a slight modification. The unit is built from very light material, thereby eliminating any problem of overhang to machine spindle. When the job requires use of a small-diameter wheel, because of adjacent shoulders or structural strength, the dresser will profile wheels down to 1½-in. dia

Round Table

Reformed or defamed?

"What's the uproar in the toolroom, Ed? Sounds like you've got a strike going on."

"It just about amounts to that, Al. It seems the Personnel Department hired George Mott back, and the boys don't like it a bit."

"What is he, an ogre?"

"Almost, Al. He's actually a very good engraver, and he used to work here, about five years ago. The trouble is, he decided to make his own ten-dollar bills, without benefit of government blessing, and he got caught and put away. Now he's out, and wants his old job back."

"Why not give it to him, if he's good and if you have the opening?"

"Oh, he's good, all right, and we could sure use him. But the other men don't want him in the shop, so I guess that cuts it right there. If I did let him stay, they would probably all walk out."

"What's the matter with that gang? They're no bunch of angels, themselves. Besides, if Mott has paid his penalty, why not give him a second chance?"

"Well, I'd like to, Al, but how can I convince the men that he's harmless now? They must think some of his criminal tendencies will rub off on them, or something. I suppose they have some right to decide who they want to work with, at that."

"The hell they do, Ed! That's as bad as racial discrimination. If the federal government has given him a bill of health, who are they to pass judgment on the man?"

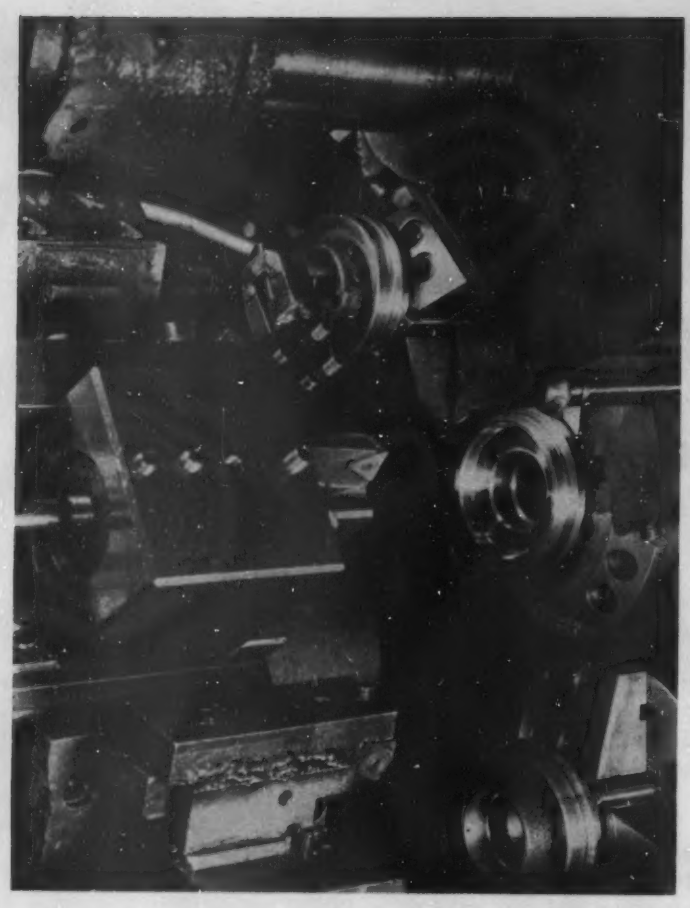
"Well, it's an uncomfortable situation, Ed. If you want to be fair about it, Mott was really a good man until he made a set of plates for a ten-dollar bill. His record is good, except for that one slip. But you have to admit that the men have a point."

"I do not!"

"Well, look, Ed; I never worked with a real, live ex-con myself; and I think I'd be a bit leary of him if I had the bench next to him. Who knows what kinds of friends he made in the penitentiary? Maybe he's already plotting to make another set of fake plates. You're probably right in thinking we should be charitable, but . . ."

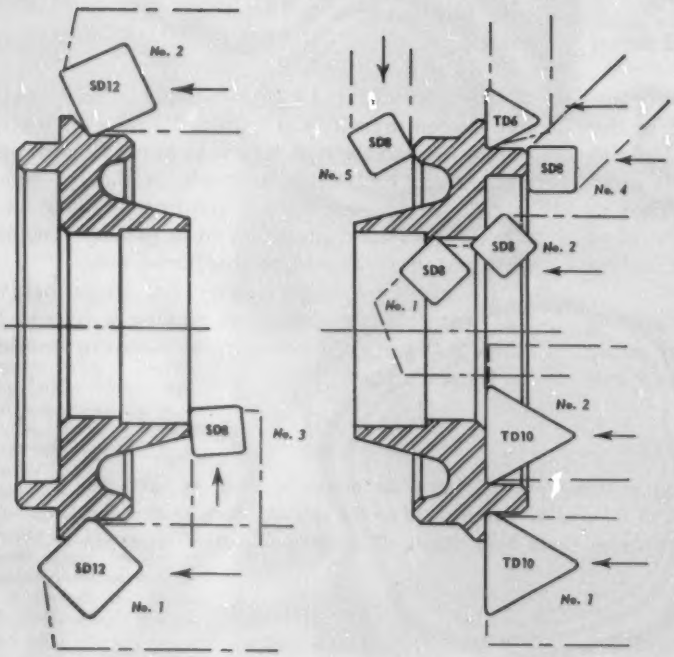
"I doubt if he wants charity, Ed. He probably just wants a fair chance at making a living. I think that gang of morons in the toolroom should be horsewhipped."

***IS THE TOOLROOM** gang dead wrong in threatening to quit if an ex-con is hired, or have they some right to their fear of the man? Can Ed and Al take a stand on the side of justice, or must they bow to the demands of the men? Your opinions could help others. Discussions of earlier topics appear on later pages.*



Tool Cost Cut is 59%

. . . for one operation, plus a 300% increase in production per shift, when standard-tipped, single-point carbide tooling on this 8-spindle automatic was replaced with Kennametal Kendex tools, which provide either three (triangular) or four (square) cutting edges per tool. In addition to facing and chamfering the parts, SAE-1020 forged liner rings, operations include multiple turning both outside and inside diameters. Work is fed at 0.006 ipr, while turning at a maximum of 570 sfpm. Machine provides 60 hp and depth of cut varies between ⅛ in. and ⅝ in. on roughing and 0.030—0.050 in. for finishing. New cutting-tool design eliminated excessive downtime for tool changes



PREVIOUS CARBIDE TOOLING

	ROUGH TURN OD	FINISH TURN OD
Tool Cost	$25.00	$ 3.00
Regrind Cost	5 at $2.00 each	4 at $0.50 each
Total Tool Cost	$35.00	$5.00
Average Pieces per Tool	1200	1200
Tool Cost per Piece	$0.023	$0.004

Total Tool Cost Per Piece: $0.027, or $2.70 per 100 Produced

KENDEX TOOLING

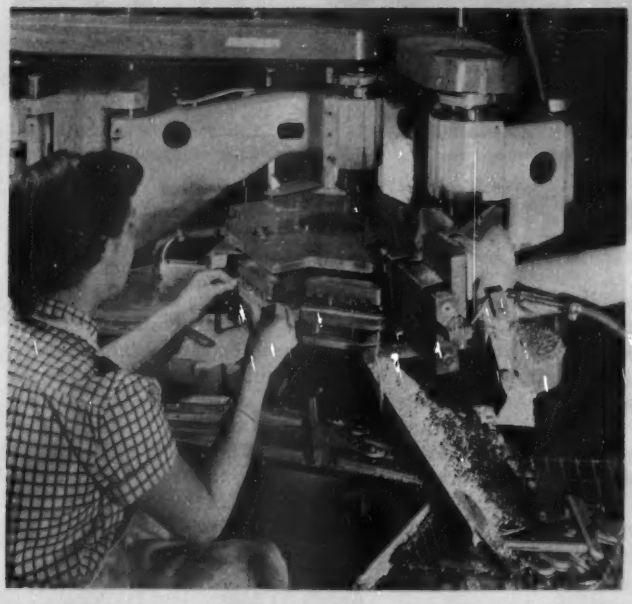
	ROUGH TURN OD	FINISH TURN OD
Cost of holder	$35.00	$16.00
Prorated Over 100 Inserts	0.35	0.16
Cost of Insert	4.84	2.00 (grind only)
Total Tool Cost	5.22	2.16
Average Pieces per Tool	600	1000
Tool Cost per Piece	$ 0.009	$ 0.002

Total Tool Cost Per Piece: $0.011, or $1.10 per 100 Produced

Jigs and rigs cut densified wood

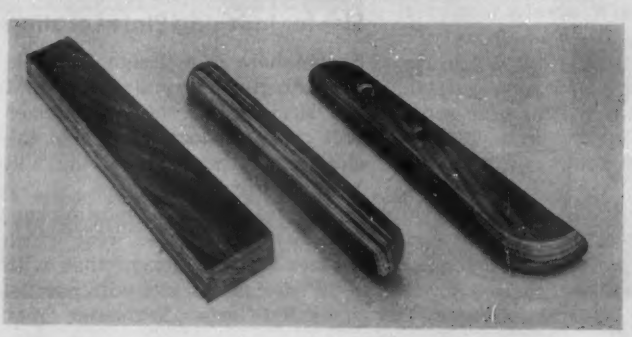
Three special machines do special jobs at Formica Co, Cincinnati, O, to shape and machine Strata-wood handles for cutlery. Machines were designed and built in the company's shops

DRILLING AND COUNTERBORING puts rivet holes through handle blanks in the right place for rivets to engage blade shanks. Step drills are air operated in automatic cycle when blank is pushed into fixture slot by handle. As handle is pulled back, blank is ejected into basket



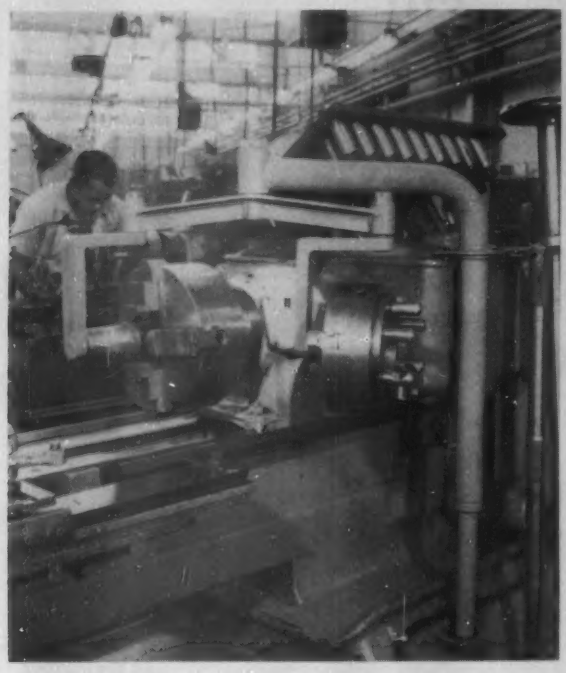
SLOTTING MAKES WAY FOR STEEL TANG to be attached later. Work is fixtured on rotary table under vertical miller that operates saw in horizontal plane. Eight fixtures carry blanks past cutter; then blanks are air-ejected (no picture)

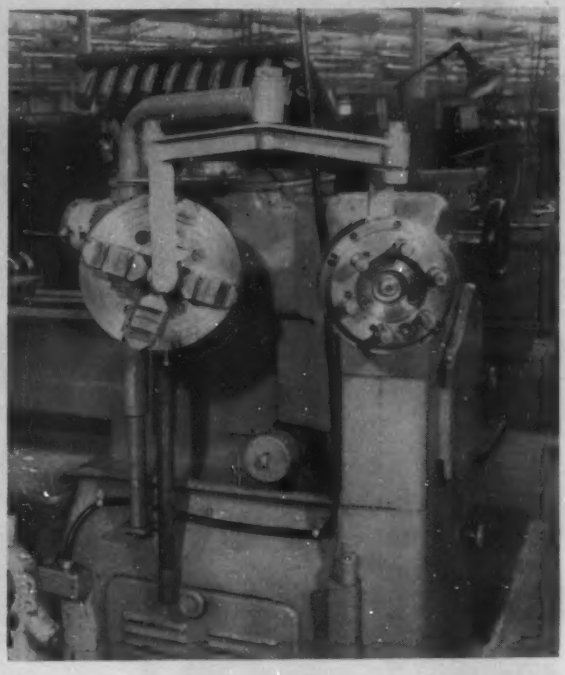
CONTOURING MAKES FINAL HANDLE SHAPE; different curves at larger and smaller ends of blank are formed by fixture location from center of rotating table. Half the eight fixtures are closer to center. Radius form cutters can cut up to 75,000 blanks before regrinding



. . . IN THREE STAGES

Practical Ideas . . .





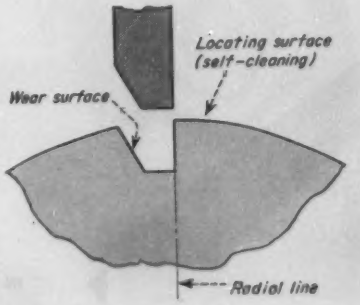
Lathe-Chuck Crane Aids Handling, Storage

Loading, unloading, and storage of lathe chucks of more than 10-in. capacity is often hazardous and inconvenient, because the chucks are usually handled manually, and stored wherever there is some space near the machine or machines where the chucks are usually used. The photos above show a simple way to avoid these common troubles, because all manual handling is avoided, and chucks are stored on the crane attached to the machine, ready for immediate use. If desired, the crane and extra chucks can be put in "cold" storage when not needed, because removing and attaching them is no problem at all.

To exchange chucks, all that is necessary is to put the empty crane arbor in the chuck that is on the lathe spindle (making sure the protective shoulder is behind the back edge of the jaws), tighten the chuck jaws, loosen the chuck from the spindle, and swing the crane arm around out of the way. The next chuck will be right in place, and can be fastened up ready for use.

If, for any reason, neither chuck is needed, simply swing the boom around and both chucks are stored in a convenient location. If the lathe spindle has a threaded end, the arbors of this crane will rotate to unthread or thread the chuck.

The chuck mounts and boom thrust are steel, while the bearing in which the boom rotates is of bronze. *C R Terry & C W Stuart, leadingmen machinists (experimental), U S Navy Electronics Laboratory, San Diego, Calif*



Slot for Indexing Plate Locating

Shown here is a design for slots in a direct-index plate. Note that the straight side of the plunger will clean the locating side of the slot, while the inclined side will take most of the wear.

Because of this, the locating surface is not subject to wear which insures accuracy longer than with a "V" design or a slot with parallel sides. *H J Gerber, Stillwater, Okla.*

Guided Tool In Offset Holder Aids Turning OD Of Large Hub

We do maintenance and repair work for all kinds of plants, so we get some unusual jobs which always must be done quickly, to keep a job running in the plant, or to cut down lost time.

One such job is shown above, when we were required to turn the OD of the base and main frame of a power shovel, in which the center pin of the hub was integral with the frame, which made the work very large and hard to handle.

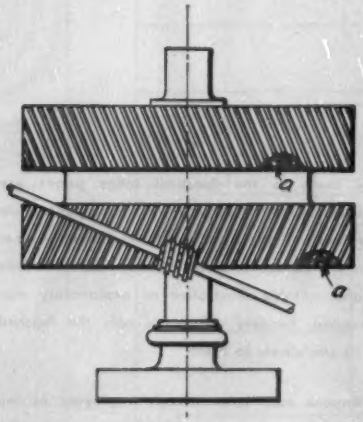
We had to add welded buildup onto the hub, to increase the worn pin to its original size, and, after using our "puttin'-on tool," we had to find some way to turn the OD of the weld.

The frame was too large for our boring mills, so we made the tool shown. The work was positioned on the base of a radial drill, and a long guide bushing was made and fitted in the top end of the pin, to guide a boring bar. The boring bar was driven by the spindle of the drill-press, and fed downward in the conventional manner.

The "overshot" tool was made and fastened to the boring bar by a collar and setscrew, and a toolbit was inserted in the lower end of the holder.

With this setup we were able to finish the work with very little trouble, with our existing equipment.

Notice that the toolholder and boring bar are of substantial size, to reduce chatter and flexing, because of the amount of overhang between the toolbit and bushing support. Also, the bushing must be appropriately long, to control the boring bar throughout its entire travel. *G H Rogers, James Machine Works, Monroe, La*

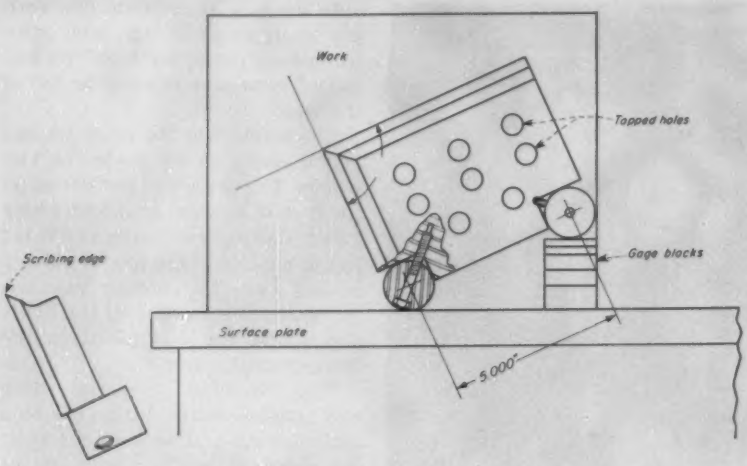


Copper Sulfate As An Aid To Machining Operations

When marking off dimensions accurately in our toolroom, we use a solution of hot water and copper sulfate, which is easily dissolved in the water. The part to be marked is degreased, and the blue solution is applied with a twist of cotton wadding. The part will be covered with a fine film of copper which will aid in making very accurate marks.

We also use the copper sulfate when milling or hobbing very large gear wheels. When the cutter is about to break through at the end of the cut, the solution is applied to the bottom of the machined area, at point *a*. Then it is possible to determine when the cutter finishes work on the gear. When cutting helical gears, it is difficult to tell exactly when machining is finished, because of the inclined position of the cutter. This can be quite important in the case of larger sizes of gears, because one revolution of the gear may take about half an hour, and, with the fine feed of finish cuts, the end-point is hard to judge.

It should be noted that the copper sulfate is not attacked by ordinary lubricating mediums. *Carl Jensen, Copenhagen, Denmark*



Knife-Edged "Sine Square" for Easy Layout

This knife-edged sine square makes layout much easier than with an ordinary sine bar. It is quite difficult and time-consuming to scribe an accurate angular layout with the ordinary sine bar, and it is difficult to make a right angle-layout which is not parallel or square to the base surface of a large workpiece.

The plate is made of mild steel, deeply carburized and ground. The working surface should be ground flat, to be laid on the surface being laid out. The two scribing edges should be carefully checked to be sure they are square.

The rolls which seat into the lower recessed corners should be long enough to support the square stably when setting up. The surface is drilled and tapped to clamp on templets, which are to be checked or laid out. *Jack Dalton, Stillwater, Okla*

Winner No. 211 of* $25 *IN ADDITION TO REGULAR PAYMENT

IN THE AUGUST 30 ISSUE

- **Larry Harrington,** Jackson, MICH **'3-Position boring bar'**
- **Henry Ramm** Columbia, CONN **'Aluminum Step-Chuck'**

for the best PRACTICAL IDEA

An extra payment of $25 is made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

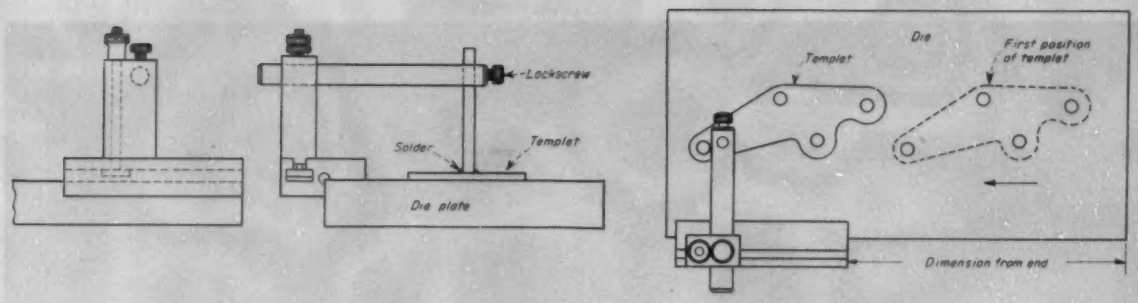
PAYMENT — $25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received — usually three to four weeks after the date of issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS — Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author — every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product — in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER — Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N Y



"Duplicator" Eases Progressive Die Layout

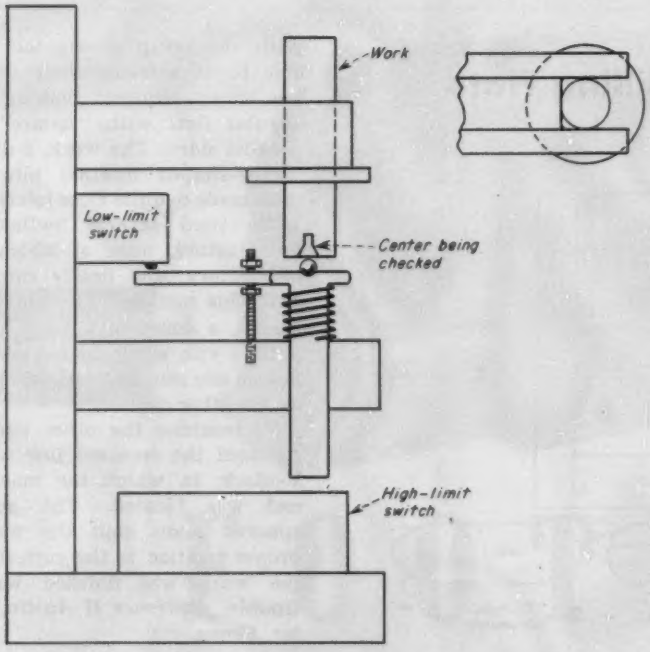
The tool illustrated is very helpful when laying out the stations of a progressive die. On this kind of work it is necessary to keep the right relationship between the holes and outline of the work, but a workpiece of odd shape can make this difficult.

Often the die can be laid out from a templet, which may be either a sample part or a hand-made master. The guiding and holding device shown solves the problem of keeping the part in place during layout.

The templet or master is soldered onto the vertical brass rod on the end of the arm, and remains fixed until all the stations have been located. The upright, supporting the horizontal arm, is held on the guide by a T-bolt. This allows the upright to be shifted from one end of the die to the other when working near the opposite end of the plate.

It is a good idea to machine the guide-surfaces of the die before beginning layout. The guide, upright, and arm may be made of hard aluminum bar, to make the tool lighter and therefore easier to use. *H J Gerber, Stillwater, Okla*

Limit Switches Gage Centers in High Production



We use precision limit switches for checking the depth of shaved centers, in somewhat the same way as the Practical Idea (*AM*—May 24, '54, p152) measured lengths of rods. The part is loaded into the checking fixture, locating against a yoke which matches the work. An arm registers the movement of the 3/64-in. ball which rests in the shaved center. If the part is over the high limit, the arm contacts the limit switch below the sliding anvil, and a red light flashes.

If the part is under the minimum, the arm is forced up by a spring, and contacts the low limit switch, flashing a green light. If the part is within the mean, no lights turn on.

The precision limit switches used in this device are accurate to about ±0.0001 in., and give us a very quick means for production gaging. *Jack W Farrell, Lafayette, Ind*

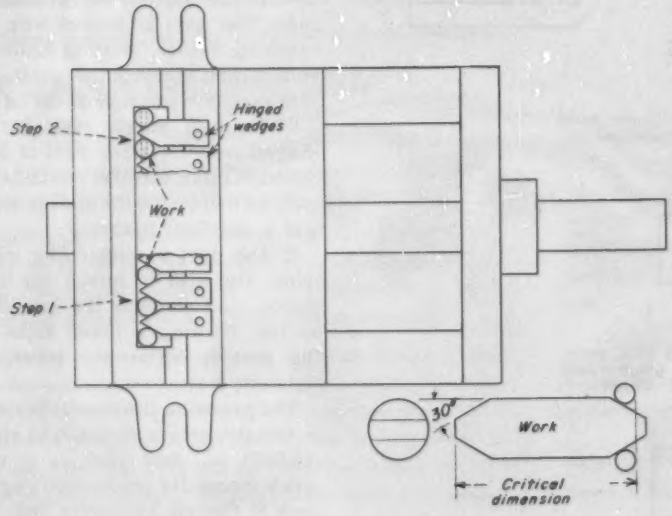
Hold-Down Screw Blocks Effective On Planers

Simple and effective hold-down screw blocks can be made as shown above, for use with planers. The blocks have many advantages over the pin-in-hole type frequently used. They are easier to install, being dropped into a T-slot anywhere along the bed of the machine, and can be spaced according to need. They are strong and rugged, and will not climb out of place because of vibration. The blocks can be added without disturbing adjacent blocks.

The 2-in.-wide blocks are cut from bars which have been form-machined on a planer, to the desired contour. The shank which fits into the slot must be curved, so the block can be removed by tilting and lifting. When seated on its base, the block cannot be lifted out of the T-slot.

For larger quantities, the blocks could be made from castings or forgings. *A G Liska, Argonne National Laboratory, Lemont, Ill*

Hinged Spacers Aid Milling Flats



With the setup shown we were able to do a troublesome milling job which required making four angular flats with "square" and parallel sides. The work, a double wedge-shaped locating pin, was to be made to quite close tolerances.

We tried several methods of manufacture, none of which was satisfactory, and finally came up with this method. The pins were loaded, a dozen at a time, into a milling vise which had a recessed jaw on one side, and hinged spacers on the other side.

To machine the other end, we replaced the recessed jaw with a V-block, in which the machined end was located. The pointed spacers again kept the pins in proper relation to the cutters, and the work was finished without trouble. *Laurence H Austin, Butler, Penna*

Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

A FASTER *more economical* MACHINING OPERATION

● Footburt Surface Broaching may be the answer to your problem of faster machining. Many jobs that were slow and expensive when handled by conventional machining methods are now being produced by Surface Broaching. Production in most cases is as fast as the speed at which parts can be loaded. Yet cutting speeds are so low that the cost of tool maintenance shows great savings. Exceptional finish can be maintained. We will gladly discuss your machining problems with you.

THE FOOTE-BURT COMPANY
Cleveland 8, Ohio
Detroit Office: General Motors Building

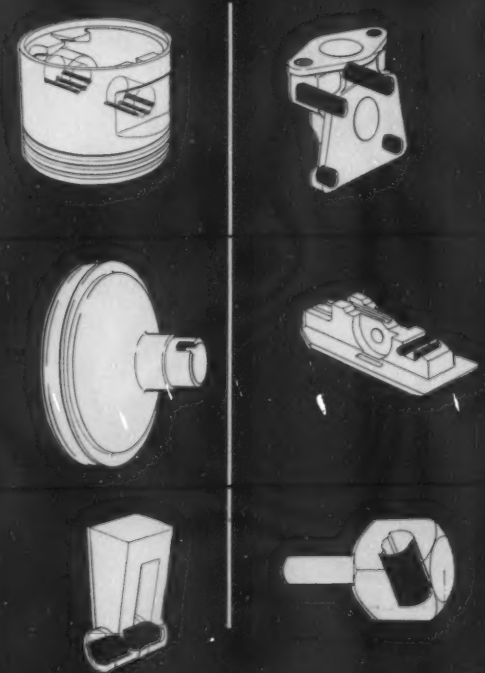
Continuous Type Broaching Machine. Made in 5 Sizes.

FOOTBURT

SURFACE BROACHING

Reduce Broaching Costs
ON SMALL JOBS

OIL GROOVES
•
SMALL SPLINES
•
SERRATIONS
•
KEYWAYS
•
SLOTTING
•
BURRING
•
SIZING HOLES



NATIONAL BROACH AND MACHINE CO.
5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN
WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

Die-Setter's Manual...IV

EDWARD P BOEHNLEIN, Tool & Die Division, Standards Dept CENTURY ELECTRIC CO

PRESSES EQUIPPED WITH AUTOMATIC FEEDERS

As a rule, the servicing of the feeding mechanism is left to someone other than the die setter. It is still his responsibility to line up the die, so that it operates as an integral unit. The die must be centralized horizontally with the feeder, the feeder must be raised or lowered vertically, and extreme caution must be used to see that the guide-ring, stripper, bolts, clamps, chutes, etc, clear all the movable parts on the feeder.

Because the blank is often shed from the punches at some point other than top stroke, care must be exercised in adjusting the knockout, to prevent serious damage to the die, the press, or the feeder. The chutes and conveyors used to carry away the parts must be fastened rigidly and in the proper place. All guards that are removed in setting the die must be replaced to protect the operator. Any part that seems to be worn or not functioning properly should be reported immediately.

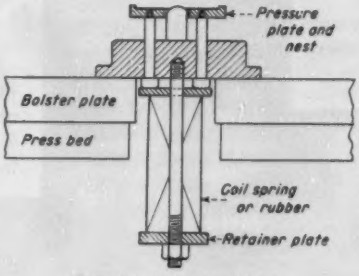
It cannot be emphasized too strongly that efficient operation of an automatic feeder depends largely on cleanliness and lubrication.

FORMING, BENDING AND DEEP DRAWING DIES

There are many different designs of dies, and some dies are operated in a single-stroke press while others operate in a double-action press. Therefore, we can only touch upon some of the most important points to check in setting a forming or draw die, particularly those which differ from a conventional blanking or perforating die.

Most important point is setting the depth of stroke. If set too shallow, the parts will not be fully formed, whereas, if set too deep, serious trouble can be caused. When a blanking die has been set and locked to cut just through the material, it will usually run this way without further ram adjustments, until the die is dull or the order is finished. This condition does not hold true for forming and drawing. The die setter should make periodic inspections while the order is being run, to see that the ram does not require readjustment.

When the lower member of the die is equipped with a spring, rubber bumper, or hydraulic pressure pad, it is good practice to set the depth of the stroke before applying the full pressure to the pressure pad. In this way, you can readily determine if the press can make its full stroke.

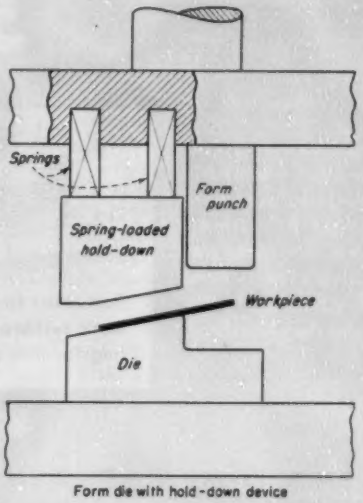


Draw die with pressure pad

When attaching a spring or rubber bumper to the die, be certain to check the clearance in the bolster plate, so as not to bind the rods, the springs, rubber, or retainer plates. Here again, the only positive way to check conditions is to crawl under the press bed with a flash light.

As a rule, forming or drawing operations are second or third stages, and the dies are designed with some sort of a nest to control the blanks. Frequently, the nests become mashed, bent or distorted. The die setter must be on the alert continuously to detect this condition as soon as possible, to prevent scrap or inferior production.

Often the upper member of the die is designed with a hold-down device; its function being to hold the piece rigid before the forming punch acts on the piece. In setting the die, the die setter should make certain that the hold-down is functioning properly.



Form die with hold-down device

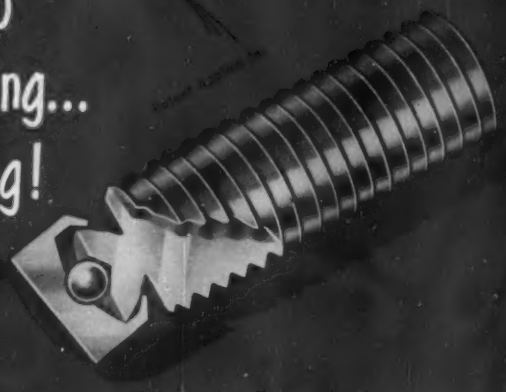
In setting the hold-down pad on a double-action press, check carefully for dirt or burrs and remove same. See that the punch has sufficient clearance through the hold-down pad. By all means, adjust the hold-down parallel with the face of die, to assure even pressure over the blank.

Because the average form or draw die is more complex than a blanking die, and the full tonnage of the press is usually directed into a blind hole or pocket, it becomes clear that extreme caution must be employed in setting the depth of the stroke.

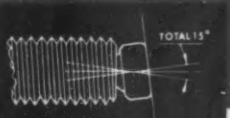
Whenever you are in doubt about the functioning of a form or draw die, ask for instructions before attempting to apply power to the press.

The die setter is in a position to be the first person to detect galling or loss of perfect radii on the punch or die member, and he should report it immediately to prevent further damage.

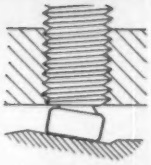
Here's the secret to positive clamping... freedom from marring!



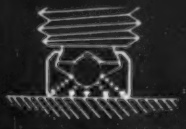
the New Vlier SCREW-BALL CLAMPS!



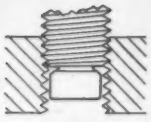
Ball-bearing construction insures frictionless, *automatic* angle adjustment and rotation; pad swivels freely in *all* directions up to 7½° from the centerline!



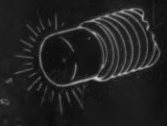
Pad seats firmly on work surface within angular range!



Force distributed equally to pad face. Conical seat distributes force equally in all directions; insures easy alignment in angular applications; greater freedom of motion.



Pad inserts from top of threaded hole or from bottom for easy installation!



Large pad area. Pad is machined from the solid, not counterbored or relieved; has greater strength plus freedom from distortion!

NO MORE EXPENSIVE, CUSTOM-MADE SWIVEL PADS . . . 17 size variations; ¾" O.D. up. N.C. threads; class 2 fit.

LOW COST... Saves hundreds of dollars annually in toolmaker's time!

NO MARRING... Rotation of pad ceases at first touch against the work! Soft seat saves surfaces!

HEX SOCKET HEAD . . . for easy hex key adjustments!

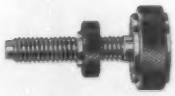
BLACK AS THE ACE OF SPADES! Completely rust proofed end to end!

KEEP VLIER SCREW-BALLS IN STOCK FOR INSTANT USE—SAVE YOUR TOOLMAKER'S TIME!

Ask your Vlier Distributor for an assortment of sizes today!

VLIER ENGINEERING INCORPORATED

MONEY-SAVING TOOLING SPECIALTIES FOR EVERY REQUIREMENT!



TORQUE THUMB SCREWS— Apply accurate, controlled end pressures; eliminate distortion to the workpiece. 4 models; 19 sizes!

VLIER SPRING PLUNGERS— For use wherever accurate, positive spring loads are needed! 4 models; 40 sizes!

VLIER SPRING STOPS— Provide end pressures in fixtures when wall sections are not available. Two models: 14 and 32 lbs. end pressure.

VLIER TOGGLE PADS— Assure solid clamping of parts with uneven or off-angle surfaces. 5 sizes; fit almost any clamp.

VLIER FIXTURE KEYS— New 5-Way Key fits every standard mill table slot. 3-Way model also available.

Write for your complete catalog of Vlier products today! It's free!

Gear-Hob Tolerances...I

HERBERT V GREGG, Chief Engineer, STAR CUTTER CO, FARMINGTON, MICH

The data that follow represent the first compilation of tolerances for single- and multiple-thread gear hobs in four classes: *A*—precision ground; *B*—commercial ground; *C*—accurate unground form, and *D*—commercial unground form.

Tolerances for single-thread hobs appear on page 159 and the tolerances for multiple-thread hobs will appear in a following number. These tolerances are based upon the hob diameters given below. For larger-diameter hobs, the tolerances should be increased proportionately.

TOLERANCE DEFINITIONS

Lead variation in any one axial pitch:

The total indicator variation in one-half revolution along the true helical path (180°) on a 2-thread hob; one-third revolution (120°) on a 3-thread hob; one-fourth revolution (90°) on a 4-thread hob; one-fifth revolution (72°) on a 5-thread hob; one-sixth revolution (60°) on a 6-thread hob.

Lead variation in any three axial pitches:

The total indicator variation in one and one-half revolutions along the true helical path (540°) on a 2-thread hob; one revolution (360°) on a 3-thread hob; three-fourths revolution (270°) on a 4-thread hob; three-fifths revolution (216°) on a 5-thread hob; and one-half revolution (180°) on a 6-thread hob.

Adjacent thread to thread spacing in plane of rotation:

The difference in the average indicator variations obtained by traversing along the true helical path of one thread, indexing and traversing in a similar manner on the successive thread.

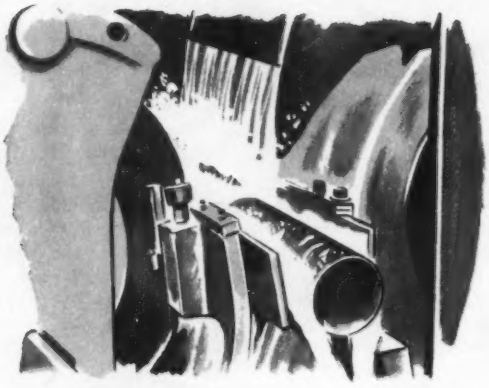
An explanation of "accurate unground form hobs" is as follows: These hobs were originated by the Star Cutter Co. The basic difference between this product and the ground form hob is that the forms of the hob teeth are not ground. In the finish back-off operation, on unground hobs, accurately ground master form tools are used to assure duplication of every tooth detail, including form, lead and thread spacing. A greater potential number of hob sharpenings is claimed because the back-off generation process is not limited by grinding-wheel clearance. In the heat treatment that follows, distortions are avoided. After hardening, the holes in the hobs are ground and honed, and the teeth are sharpened on the cutting faces. The manufacturing process is said to produce accurate hobs for less money.

HOB SIZES FOR WHICH TOLERANCES ARE GIVEN

SINGLE-THREAD HOBS				MULTIPLE-THREAD HOBS			
D.P.	OUTSIDE DIAMETER	LENGTH	HOLE	D.P.	OUTSIDE DIAMETER	LENGTH	HOLE
2	5 3/4	8	1 1/2	2	6 1/2	8	1 1/2
3	4 1/2	5	1 1/4	3	5 1/2	5 1/2	1 1/2
4	4	4	1 1/4	4	5 1/2	5 1/2	1 1/2
5–6	3 1/2	3 1/2	1 1/4	5–6	5	5	1 1/2
7	3 1/4	3 1/4	1 1/4	7	4	4	1 1/4
8–10	3	3	1 1/4	8	3 3/4	3 3/4	1 1/4
12	2 3/4 2	2 3/4 2	1 1/4 3/4	9–10	3 1/2	3 1/2	1 1/4
14–20	2 1/2 1 7/8	2 1/2 1 7/8	1 1/4 3/4	12	3 1/4	3 1/4	1 1/4
21–29	2 1/2 1 7/8	2 1 7/8	1 1/4 3/4	14	3	3	1 1/4
30	2 1/2 1 7/8	2 1 1/2	1 1/4 3/4	16–19.99	2 3/4	2 3/4	1 1/4
31 and Finer	1 7/8	1 1/2	3/4	20–29.99	2 1/2	2	1 1/4
				30 and Finer	1 7/8	1 1/2	3/4

New S.E.C.O. is Tops For These Operations

CUTTING WITH NEW S.E.C.O. Tools stay cool—require less frequent grinding. Finishes are uniformly good.



GRINDING WITH NEW S.E.C.O. Surface finishes are good. Loading and glazing of wheel are reduced—wheel life is prolonged.

WASHING WITH NEW S.E.C.O. Thorough removal of grease and dirt provides clean surfaces for smooth, long-lasting finishes.

ROLLING WITH NEW S.E.C.O. Rolls stay clean. You get maximum reductions and low power consumption.

New Sunoco Emulsifying Cutting Oil increases production, cuts operating costs. Its high machining efficiency permits uniformly good finishes, prolongs tool life. Its high detergency and purity keep tools, parts and machines clean. Its excellent mixing qualities permit its use in cold, hard or hot water. Test New S.E.C.O. in your own plant. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AM-11.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of famous High-Test Blue Sunoco Gasoline

Gear-Hob Tolerances...II

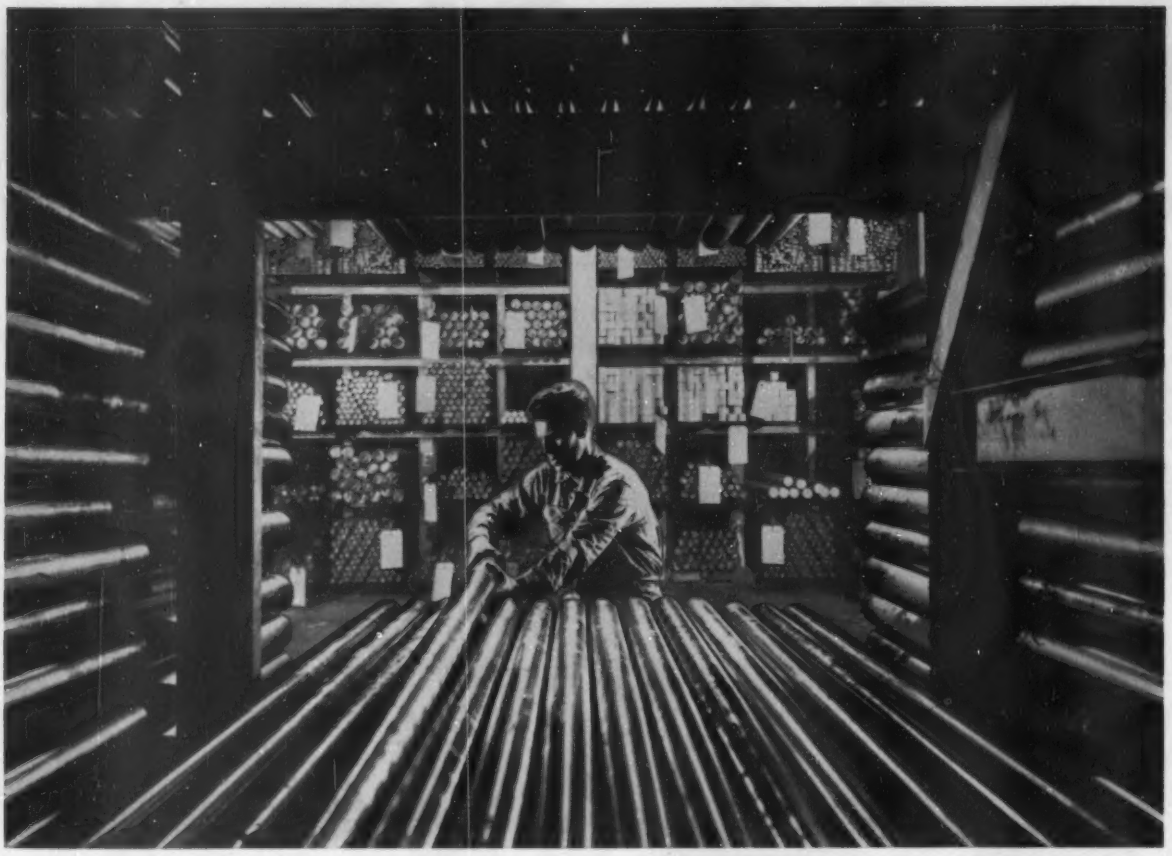
TOLERANCES FOR SINGLE-THREAD GEAR HOBS
(In Ten-Thousandths of an Inch)

DIAMETRAL PITCH ▶			2 THRU 2.999	3 THRU 3.999	4 THRU 4.999	5 THRU 5.999	6 THRU 8.999	9 THRU 12.999	13 THRU 19.999	20 THRU 29.999	30 THRU 50.999	51 AND FINER
RUNOUT*	HUB FACE	A	5	2	2	2	2	2	2	2	2	2
		B	8	4	4	3	3	2	2	2	2	–
		C	8	4	4	3	3	2	2	2	2	2
		D	8	5	5	4	4	3	3	–	–	–
	HUB DIAMETER	A	5	4	3	3	3	2	2	2	2	2
		B	8	6	5	4	4	3	2	2	2	–
		C	8	6	5	4	4	3	2	2	2	2
		D	10	8	8	6	6	5	5	–	–	–
	OUTSIDE DIAMETER	A	20	15	15	10	10	10	10	10	7	5
		B	30	25	20	15	15	15	10	10	7	–
		C	45	40	25	20	17	17	12	12	10	8
		D	55	50	45	35	35	30	25	–	–	–
LEAD* VARIATION	TOOTH TO TOOTH	A	5	4	3	2	2	2	2	2	2	2
		B	8	6	4	3	3	3	3	3	2	–
		C	12	8	6	5	4	4	4	4	3	3
		D	20	16	14	12	10	10	8	–	–	–
	IN ANY ONE TURN OF HELIX	A	18	10	8	6	5	5	4	4	3	3
		B	25	17	11	9	7	7	6	6	4	–
		C	35	22	14	11	9	9	8	8	8	6
		D	50	40	30	25	20	20	18	–	–	–
	IN ANY THREE TURNS OF HELIX	A	26	15	12	9	8	8	7	7	5	5
		B	38	22	16	12	11	10	9	9	7	–
		C	50	30	21	16	14	13	12	12	12	8
		D	100	80	60	50	40	35	25	–	–	–
TOOTH ELEMENTS	TOOTH THICKNESS (MINUS ONLY)	A	20	15	15	10	10	10	10	10	5	5
		B	20	15	15	10	10	10	10	10	5	–
		C	25	20	20	15	15	15	15	15	10	10
		D	35	30	25	20	20	20	20	–	–	–
	START OF APPROACH (PLUS OR MINUS)	A	180	160	140	120	100	80	60	40	30	–
		B	200	180	160	140	120	100	80	50	40	–
		C	200	180	160	140	120	100	80	60	50	–
		D	240	220	200	180	160	140	120	–	–	–
	SYMMETRY IN START OF APPROACH	A	130	120	100	90	80	60	50	35	25	–
		B	150	130	120	100	90	80	70	45	35	–
		C	150	130	120	100	90	80	70	55	45	–
		D	180	160	140	120	110	100	90	–	–	–
	PRESSURE ANGLE OR PROFILE*†	A	5	3	3	2	2	2	2	2	2	2
		B	8	5	5	4	3	3	3	3	2	–
		C	15	10	5	4	3	3	3	3	3	3
		D	55	30	18	12	8	8	6	–	–	–
SHARPENING*	SPACING BETWEEN ADJACENT FLUTES	A	30	25	20	15	10	10	10	10	10	10
		B	45	40	30	20	15	15	10	10	10	–
		C	45	40	30	20	15	15	10	10	10	10
		D	60	50	50	30	25	25	20	–	–	–
	SPACING BETWEEN NON-ADJACENT FLUTES	A	60	50	40	30	30	30	25	25	20	20
		B	90	80	60	50	50	50	40	35	30	–
		C	90	80	60	50	50	50	40	35	30	30
		D	120	100	100	80	80	70	60	–	–	–
	CUTTING FACES RADIAL TO CUTTING DEPTH	A	15	10	8	6	5	5	3	3	3	3
		B	25	15	10	8	7	7	5	5	5	–
		C	25	15	10	8	7	7	5	5	5	5
		D	75	50	40	30	20	20	15	–	–	–

FACE WIDTH		UP TO 1 IN.	1.001 TO 2 IN.	2.001 TO 4 IN.	4.001 TO 7 IN.	7.001 IN. AND UP
	ACCURACY OF FLUTES (STRAIGHT AND HELICAL)	A 10	15	25	30	50
		B 10	15	25	30	50
		C 10	15	25	30	50
		D 15	23	38	45	75

HOLE DIAMETER		2.500 IN.	2.000 IN.	1.500 IN.	1.250 IN.	.750 IN.	.500 IN. AND SMALLER
	(PLUS ONLY)	A 8	8	5	2	2	2
		B 10	10	8	3	2	2
		C 10	10	8	3	2	2
		D 10	10	8	5	4	3

NOTE: * Total Indicator Reading. † Exclusive of Modification for Tip Relief (Approach)



Aimed right at your alloy needs

the world's largest alloy steel stocks

Thousands of tons of certified alloy steel in 1698 different sizes, shapes, analyses and conditions await your call at Ryerson. New leaded alloys are on hand in three different carbon ranges. Standard analysis steels are supplemented by a wide range of aircraft quality alloys. No matter what your alloy requirement, you can depend on Ryerson for quick delivery of highest quality steel.

You won't need to check or test your dependable Ryerson alloys before you use them because every bar has been spark tested and identified with its own heat symbol—every heat has been hardenability tested for you as part of an 8-step quality control plan. And should problems of application or fabrication arise, Ryerson alloy metallurgists will gladly put years of practical experience to work for you.

No order is too large to fill from stock, no order too small for quick personal service—so, next time you need alloy steel call your nearby Ryerson plant.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled & cold finished.

ALLOYS—Hot rolled, cold finished, heat treated.

STAINLESS—Allegheny bars, plates, sheets, tubes, etc.

TUBING—Seamless & welded, mechanical & boiler tubes.

STRUCTURALS—Channels, angles, beams, etc.

PLATES—Many types including Inland 4-Way Safety Plate.

SHEETS—Hot & cold rolled, many types & coatings.

MACHINERY & TOOLS—For metal fabrication.

RYERSON CERTIFIED STEELS

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Talking Shop . . .

Other One

TOP AND BUTTOM CASTINGS for a 15,000-ton hydraulic press to bend armor plate looked alike and arrived from the foundry at the same time. To speed assembly, the bottom casting should be machined first, so the machine-shop foreman told one of his boys to mark with chalk the order of machining. A few days later, visiting brass hats were startled to see on one casting, "This is the other one." A little farther down the shop was its mate, on which was neatly lettered, "Machine this casting before the other one." The machinist who did the lettering was taking no chances.

12 to 1

RECENT REPORT indicates bids on a particular gear to the government ranged from $12.95 to $152.35. There were some 26 companies bidding, and the offers indicated little real grouping of bids. That's an indication that several somebodies had better do a little studying of costs. Two to one is readily possible, but 12 to one is a sure sign of blind costing.

Crazy — But Smart

FRIEND OF OURS was driving beside a local insane asylum when he had a blowout in the left rear tire. As he removed the wheel, he placed the nuts in the hub cap set out beside him. He rolled the defective wheel to the rear and began to interchange it with the spare. Just then, another car passed — so close that a wheel touched the hub cap and flipped it up, throwing the nuts all over the place. Diligent search turned up only one, so the driver was in a quandary. Just then, an inmate of the institution, watching over the fence, said: "Why don't you take one nut from each of the other wheels? That will give you four there —enough to get you to a service station." Said the driver: "Hey, maybe you'd better come out here, and I'll go in there!"

"Don't be silly," said the inmate. "I may be nuts, but I'm not stupid!"

Potential Plane

SPEEDS up to 3000 mph at sea level, 7000 mph at 185,000 ft, are possible with plane materials already tested, according to Spencer Shaw, design specialist at Douglas El Segundo. Outside body heat would be 1400 F at such speeds, so aluminum would fail, but stainless and cobalt-base alloys would hold up. Ti is good to about 700 F. Major heating would occur during a dive—might require spray-cooling the surface through skin pores. In a recent plane with gross weight of 18,000 lb, Douglas built 8400 lb, requiring 23,000 lb of raw materials, including 80 different types of metal.

Fluid Switchboard

AN UNUSUAL SYSTEM for switching the flow of oil from storage tanks to mixers and thence to secondary storage tanks is employed by Gordon Lubricating Co, McKees Rocks, Pa. Trunk lines are led to a piping "switchboard" into which sections of flexible hose with Titeflex quick-seal couplings can be plugged. To switch any desired blending ingredient into the mixing tank, the operator connects that tank's discharge line to the pump feeding the mixing tank, by plugging in on the switchboard. After mixing, he can similarly switch the contents of the mixing tank to any desired storage tank. When a batch of any particular blend is to be packaged, the appropriate tank outlet is plugged in to the pump feeding the packaging machine. Such a system might be used for cutting fluid or other metalworking mixes.

Page Mr Lionel

REMOTE CONTROL for locomotives has been developed by Krupp, Essen, and may prove to be the solution to some of the problems encountered in loading and unloading bulk-carrying trains. A 264,000-lb electric locomotive can be driven and controlled by an ultra-high-frequency mechanism from the seat of the crane or steam-shovel operator. The latter can drive the train back and forth past the loading point and stop it in the most convenient location. When the remote control is "In," the locomotive engineer has no control over the train, but he can communicate with the operator by special acoustic signals. When the remote control is "Out," the engineer takes over again. The locomotive is particularly suitable for use on trains in open-pit mining operations.

Number Please

TRAIN-TIME INFORMATION from the telephone company is now available to the traveler in West Germany. In Hamburg one can dial a special number and obtain prompt information about train schedules, in much the same way as correct time or a weather forecast are obtainable here. The service is being extended by the West German telephone system to other areas.

"Flat Look"?

CHRISTIAN DIOR and his new silhouette for women may make trouble in an unexpected way—in shop safety. The "flat look" makes the sweater girl obsolete, and thus may help the male safety curve and cut the wolf whistles. But the trend to long strings of beads, tassels, sashes, and other dangling and protruding gadgets means real trouble with modern machinery. In the 20's there were few women running machines, and there were fewer complex machines that conceivably might catch any hanging decoration. To make the "flat look," there'll have to be "fluffy" stuff at the midriff, and that spells shop trouble.

News of Metalworking . . .

1955's MACHINE TOOL SHOW: Chicago

"The manufacturer . . . has not had such an opportunity for eight years: and will not have another for five more"

CLEVELAND — Chicago's International Amphitheater will house the first Machine Tool Show in eight years September 6-17, 1955, it is announced by the National Machine Tool Builders' Association.

The show's exhibits, with the exception of those of the trade press, will be confined entirely to American-built machine tools, and to machine tools only. No foreign builders will exhibit, and no foreign-built machine tools will be shown. More than 150 US companies will display their wares — constituting the largest exhibit of machine tools ever held under one roof.

Production Engineering Show

Running concurrently and in conjunction with the Machine Tool Show will be the Production Engineering Show at Chicago's Navy Pier. The latter show will exhibit corollary equipment and instruments.

The 1955 Show's space is limited, in contrast to the 1947 Show, which was housed in the spacious Dodge plant and could accommodate both machine tools and accessories. It is because of this factor that 1955 will have separate Machine Tool and Production Engineering Shows. Shuttle buses will run between the two.

To house the Machine Tool Show, International Amphitheater is adding 188,000 sq ft of floor space, which added to its present 240,000 sq ft, will give the Machine Tool Show 428,000 sq ft floor area. While this is substantially less than the combined machine tool-accessory area at the 1947 Show, it constitutes the largest available floor space for machine tool exhibits in the US.

Thousands of new machine tool models — ranging in size from that of a small desk to a two-story house, and in weight from a few pounds to well over 50 tons — will be shown. Tallest machines will be displayed in the Amphitheater's centrally located arena, which has a 73-ft ceiling. Clearances in other exhibit floors range from 15 to 26 ft, with floor load virtually unlimited in all display areas except the second floor. These areas will be available: (1) the arena, (2) north and south halls on either side of the arena, (3) north and south halls on the second floor, and (4) the new Exposition Hall on the ground floor.

"One Enormous Machine Shop"

These areas will give the impression of one enormous machine shop, with nothing to obstruct the view but the machines themselves. The Amphitheater and the Exposition Hall are under a common roof and open to each other. Practically all machine tools will be in operation at the Show.

Power will be provided by a new high-tension line from Chicago's

DoALL's "Civilization Through Tools"

ON CURRENT ITINERARY: THE EAST, CANADA

DESPLAINES, ILL—The role of tools in man's progress—from prehistoric times to the present—is being graphically portrayed throughout industrial America by a caravan exhibit sponsored by the Wilkie Foundation, established by Leighton Wilkie, president of the DoALL Co of this city. The caravan carries 10 display panels, most of them mounted with actual prehistoric tools, each depicting a phase of "Civilization Through Tools"—from man's beginning down through the Bronze and Iron Ages to today's machine tools. The panels will be shown, accompanied by a descriptive talk, in the East and Canada this winter and early spring. A wall chart summarizing the panels will be reproduced in the December 20 issue of American Machinist as a Christmas gift to our readers.

CARAVAN (top) CARRIES COMPLETE DOCUMENTARY EXHIBIT (below) to be set up at engineering society meetings, historical societies and clubs throughout the country. Wilkie Foundation head C G Scheely is the speaker

Will Be the Showcase for 150 US Builders

Central Manufacturing District power plant. Total connected horsepower will run to 60,000 kva — the largest load of any building in the world.

The Amphitheater's lighting system has been augmented to bring it up to the level of that in the new Exposition Hall (30 ft candle at working levels).

A 451-ft-long depressed railroad track in the new Exposition Hall can accommodate 10 railroad cars at a time — allowing machines to be unloaded directly onto the exposition floor. The Exhibition Hall's south end will have a truck platform that can accommodate five trucks at once, also allowing for direct unloading onto the exposition floor. Show officials estimate it will take at least 300 railroad cars and 1000 trucks to handle the exhibits.

Admission by Registration Only

Admission will be by registration only to the Show, which will be open daily from 10:00 am to 5:30 pm, except on Sunday (closed).

Visitors can reach the Show from downtown hotels by special bus, the elevated, taxicab or streetcar. Chartered Show buses will maintain a continuous shuttle service over three routes: (1) from Loop (downtown Chicago) hotels to the Machine Tool Show and back, (2) from Loop hotels to the Production Engineering Show at Navy Pier and back, and (3) between the Machine Tool Show and the Production Engineering Show.

10,000 Hotel Rooms Reserved

More than 10,000 Chicago hotel rooms have already been reserved for Show visitors. Chicago's Convention Bureau reports that on the basis of hotel reservations, the 1955 Show will be the largest industrial event in US history.

Steamships and airlines have made plans for overseas Show visitors — with special flights from various countries, and steamship reservations arranged.

What Will the Show Offer?

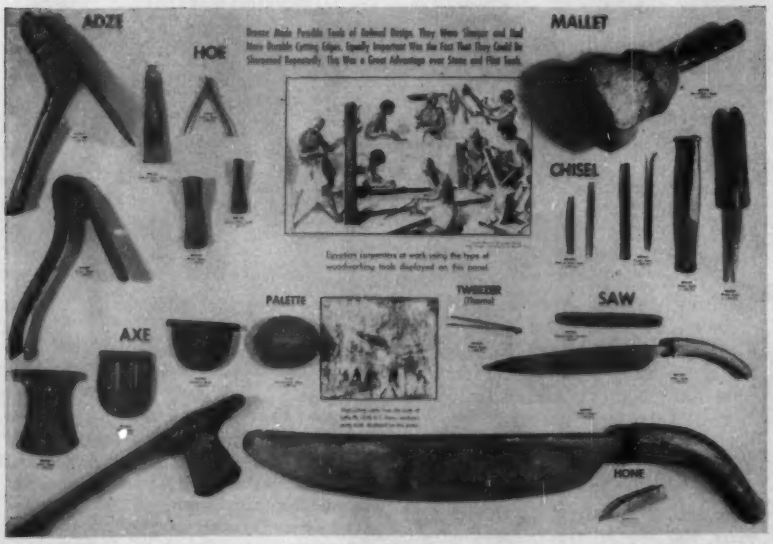
What will the 1955 Machine Tool Show offer Metalworking? Here's how NMTBA's Show Committee Chairman William E Rutz of Giddings & Lewis Machine Tool Co sums it up:

"Never before have development and design in machine tools moved forward at such a rapid pace as has been the case during the last five years. And within the last year-and-a-half this pace has been accelerated because the return of extremely competitive conditions throughout all American industry has made immediate cost reduction imperative.

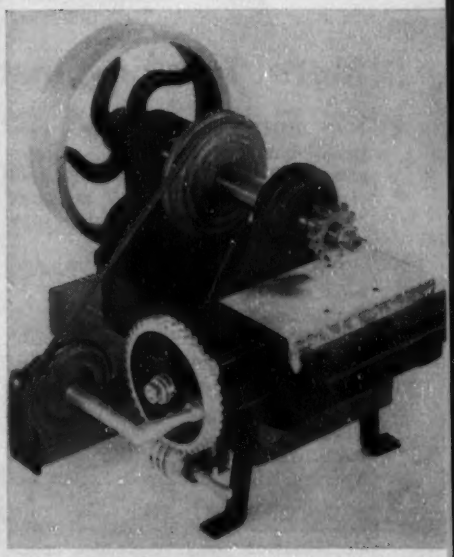
"The replacement of obsolete machines by new models that cut cost-per-piece-produced represents the greatest single avenue of opportunity for savings open today to Metalworking companies striving to maintain a competitive edge.

"The slogan of the Machine Tool Show is 'the world's best investment *in action*.' By visiting the Show, the manufacturer may see *in operation*, and compare, the various makes and types of machines that may be appropriate for his replacement requirements. He has not had such an opportunity for eight years; and will not have another for five more."

Caravan Tours Industrial America



ACTUAL PREHISTORIC TOOLS ARE MOUNTED ON THE DISPLAY PANELS. This one shows a part of the panel representing the Bronze Age. The panels, ten in all, cover metalworking from the first hand tools to the present



ELI WHITNEY'S MILLING MACHINE is duplicated in exact scale as part of the traveling display

Monarch Turns Out Its 50,000th Lathe

. . . and the 45-year-old Ohio machine-tool firm made it an occasion to unveil a new concept in metal-turning, and to open its Demonstration Center

MONARCH'S 50,000th LATHE is readied for shipment as Monarch President Jerome A Raterman (left) and Sales Manager Stanley A Brandenburg look on

SIDNEY, OHIO—Introduction of a lathe that embodies a new concept in metal turning, and the opening of its newly completed machine-tool Demonstration Center on November 9 were Monarch Machine Tool Co's way of celebrating production of its 50,000th lathe since Monarch was founded 45 years ago.

The new lathe, called the Dyna-Shift, achieves any desired cutting speed with the flick of a wrist automatically, eliminating the possibility of human error, and will be available in three models. A detailed description will appear in the Shop Equipment News Section in the December 6 issue of *American Machinist*.

Monarch's new Demonstration Center, previewed November 9, will show 15 of the company's latest models in operation. This air-conditioned 4000-sq-ft area is located in an already-built addition that also houses a new auditorium on the second floor, and the company's new executive, sales and engineering offices.

The new Demonstration Center is notable for its 65-foot-candle-at-working level overhead lighting, its many craneways and power lifts that facilitate moving of both machines and work, and a planned power distribution system that has outlets at 2-ft intervals along the entire floor to feed the demonstration machines at any location.

On the occasion of Monarch's passing its 50,000th-lathe milestone, Monarch President Jerome A Raterman had a word to say about the future, too — "Further assurance of our ability to continue to operate profitably is to be found in two things — an incoming volume of business which is more than one-third greater than pre-Korea — and a continuing research program which by producing a succession of improvements in our products is helping to create an expanding market for them."

Metal Treating Institute Meets

NEW ROCHELLE, NY — Research, profit-sharing productive maintenance, and closer liaison with tool steel makers occupied the agenda of Metal Treating Institute's three-day meeting here October 29-31.

Speakers included Leslie S Fletcher, director of American Society of Tool Engineers' Research Fund; C B Post, chief metallurgist, Carpenter Steel Co; D R Stewart, manager Chicago Service Shop, and H E Scarborough, heating specialist, General Electric Co; Al Ridinger, president Metallurgical Inc; and E P Tang of Touche, Niven, Bailey & Smart, accountants.

C M Cook of Cook Heat Treating Co, Houston, was re-elected president of the Institute. Also re-elected were: vice president, C R Weir, Commonwealth Industries Inc, Detroit; and treasurer, Lloyd G Field, Greenman Steel Treating Co, Worcester, Mass.

New directors elected were: Arthur Eklund, Metal Treating Inc; Love Park, Ill; Howard N Bosworth, Bosworth Steel Treating Co, Detroit; and A E Leidig, Hollywood Heat Treating Co, Los Angeles.

An outstanding event at this year's meeting was the presentation of Metal Treating Institute's First Annual Achievement Award to Ken U Jenks, secretary-treasurer of the Lindberg Steel Treating Co, who was named the recipient in honor of his work as chairman of MTI's Cost Accounting Committee. During the year, the committee presented four papers outlining a complete cost accounting system for commercial heat-treating.

NTDMA Cited

NTDMA'S APPRENTICE PROGRAM won that organization the American Trade Association Executives Grand Award for outstanding public service at ATAE's recent convention in Los Angeles. Here, Dr G W Robbins of UCLA (left) presents the citation to Harold G Murdock, newly elected secretary of NTDMA

Gisholt Adds Extended Payment Plan to Leasing Setup

MADISON, WIS—Gisholt Machine Co of this city is combining its machine tool leasing setup, announced last April, with a new and different extended payment plan. Idea behind the double-barreled leasing plan, according to Gisholt President George H Johnson, is that a large percentage of future machine tool sales will come under the time payment plan, particularly in view of the new tax codes and faster depreciation.

Gisholt has gone a step farther than most financing plans with regard to the customer's pocketbook. For example, any new Gisholt machine can now be obtained with a 20% down payment. The balance can be spread out in equal payments over 12, 24, 36, or 48 months, depending upon the plan selected.

Interest Pattern Reversed

The standard pattern of handling interest charges has been reversed—starting with the lowest amount, and gradually increasing. This gives the buyer two advantages: (1) it gives him the use of more money during the earlier periods, and (2) since the customer may pay up the note at any time without penalty, he can avoid paying the higher interest rates at the end of the contract.

Gisholt's interest rates range from 3.25% on the original unpaid balance for the one-year plan, to 3.06% for the four-year plan. Gisholt also absorbs legal fees up to the time of shipment.

To aid metalworking executives in keeping up with rapid developments in industrial equipment leasing and buying, Gisholt is offering a free bulletin that discusses leasing and time payment plans, cost comparisons, depreciation under the new tax codes, and related subjects so that the user can appraise his own situation and find the plan best suited to his needs. Copies are available from Gisholt Machine Company, Madison 10, Wisconsin.

Bullard Announces New Lines

They include vertical turret lathes; horizontal boring, drilling and milling machines, and automatic multiple-positioning equipment

BRIDGEPORT, CONN — Completely new lines of Cut Master vertical turret lathes; horizontal boring, milling and drilling machines; and Mult-Au-Matics were introduced here at a press preview on November 3 by The Bullard Company.

The company will go into production on these new lines in 1955, marking the occasion of its 75th Anniversary.

By way of pointing up the research and development work that has gone into producing the new lines, Bullard displayed what it calls "genuine antiques" at the press preview—the old prototype Bullard machine tools.

One of Bullard's new line of machine tools is the 46-in. Model 75 (in honor of Bullard's forthcoming anniversary) Cut Master vertical turret lathe. This machine incorporates, among other improvements, pendant control to allow the operator instant fingertip access to controls from a moveable vantage point. Electrical controls are built into the bed of the Cut Master 75 and are completely concealed and protected from contamination but easily accessible.

Constant Feed

Bullard's Type L Mult-Au-Matic, also to be in production next year, is the newest of several successive models since its original concept in 1914. Two outstanding features of the Type L are a control system that facilitates head-setting and tool adjustment with a minimum of effort on the operator's part; and a completely new screw-type feed mechanism. This has a total available stroke of 16-in. and is claimed to offer more constant advance of cutting tools to the work than is possible with cam-drum feed. Details on the new Bullard tools will appear in AM's Shop Equipment News.

CAPITAL EQUIPMENT STUDY SET UP AT ILLINOIS TECH

CHICAGO—Ingersoll Milling Machine Co's Ingersoll Foundation, Rockford, Ill, has set up a $16,500 three-year fellowship study of the economics of capital equipment replacement at the Illinois Institute of Technology here.

Under the fellowship, the school will receive three annual grants of $5500 for investigation of the problem, which will be carried out through the National Center of Education and Research in Dynamic Equipment Policy, co-sponsored by Illinois Tech, Machinery & Allied Products Institute, and the Council for Technological Advancement, all of Chicago.

First Ingersoll fellow will be Raymond R Mayer of Chicago, former methods analyst for Ford Motor Co.

PMI STAMPING REDESIGN ENTRIES DUE DECEMBER 31

WORCESTER, MASS—December 31 is the deadline for entries in Pressed Metal Institute's annual John Woodman Higgins Redesign Award contest, a new competition honoring the man who has done the most original and outstanding redesign work in the field of metal stamping during the year. The award carries a cash prize of $500.

The first award, named in honor of Worcester Pressed Steel Co's board chairman, will be presented at the next PMI spring technical meeting, based on (1) production by metal stamping of a part previously turned out by another metalworking process, (2) originality of design, and (3) cost savings in the changeover to stamping.

Entries should be sent to the John Woodman Higgins Redesign Award, Pressed Metal Institute, 2860 East 130th St, Cleveland 20.

Pressed Steel Car Co Changes Its Name

NEW YORK—US Industries Inc is the new corporate name of Pressed Steel Car Co Inc of this city. The company's 55-year-old former title was felt to be no longer symbolic of its widely divergent products and operations, particularly since Pressed Steel closed its remaining car plant this year. Its subsidiaries include Clearing Machine Corp and Axelson Machinery Div.

Metal Show, Four-Society Technical

Purely from a Metalworking viewpoint, here are the highlights and sidelights of the record-breaking five-day National Metal Exposition & Congress held recently in Chicago

CHICAGO — Attendance clocked at the 1954 Metal Show, held at the International Amphitheater here November 1-5 exceeded 63,500, topping the 1953 Show in Cleveland by 13,500.

The Metal Show held the spotlight with concurrent technical meetings of four societies — American Society for Metals, AIMME's Institute of Metals Division, American Welding Society, and the Society for Non-Destructive Testing — at downtown Chicago hotels.

Highlights of this year's Show included new developments in vacuum melting, non-destructive testing, welding developments, and electrical discharge machining. One thing was noticeable among the 444 exhibits — a scarcity of really new products of interest to Metalworking. Most of those shown had premiered at previous Shows, or had been described in the technical press.

One of the few new materials shown was a line of austenitic, nonmagnetic electro alloy steels reported to be highly corrosion and heat resistant to the degree that they can replace stainless in some applications. These steels will be available in commercial shapes, as rolled products, forgings, castings and billets, and as shot and powder.

Two firms showed metals melted in a vacuum on a commercial scale. Ingots weighing 5-1200 lb can be poured in mold containers that are part of the vacuum systems. Five other exhibitors showed vacuum and inert-atmosphere furnaces that melt alloy metals and then cast them to required shapes without contamination by gases.

More than a dozen makers exhibited non-destructive testing equipment and processes, including portable x-ray units, one of them a million-volt unit mounted on a

Turning and Threading Pipe Ends

WYMAN-GORDON MACHINES "SPAGHETTI" PIPE ON UNIQUE SETUP

GRAFTON, MASS—Weird, "spaghetti"-like low-carbon steel pipes for hydraulic systems used on Air Force giant presses, are being machined here in a unique setup developed by Wyman-Gordon Co of this city.

Wyman-Gordon, which will soon start operation with two of the huge presses—a 35,000-tonner and a 50,000-tonner, was faced with the problem of machining the ends of the odd-shaped pipe, which was forged, turned and bored by Bethlehem Steel Co.

The pipes, which will carry water with a 2% soluble oil from eight pumps to the presses, are designed to withstand 6700 psi. In all, Wyman-Gordon's system will use over a half-mile of these pipes.

The pipes are a combination of weird shapes, and vary in diameter from 6 to 8 in., with wall thicknesses from 1-9/16 to 2-3/8 in. In length, they run from 8 to 29 ft.

Because of their configuration, determining how to machine the pipe ends presented a knotty problem. Specifications required holding concentricity to ±0.015 in. to pipe axis. To avoid accumulation of error over the entire hydraulic system, end faces and coupling seats had to be held square to each other within 0.015 in. TIR. The photographs at the right tell how Wyman-Gordon did it.

Before turning . . .

COMMON CENTERLINES are laid out on each piece. Pipe is then setup and machined to layout lines. Pre-shaped pipe is machined on a Giddings & Lewis horizontal boring machine with spindle extended into an underarm support

Program Draw Record 63,500

power lift truck; magnetic analysis units, and ultrasonic inspection devices. One firm showed an x-ray diffraction stress analyzer that can be carried in the hand. Another showed a tension analyzer for high-speed wire drawing.

Interest in ultrasonic cleaning ran high at the Show, with six firms showing new or improved equipment. One maker has developed high-power (up to 250 kw) ultrasonic cleaning units that operate at 10,000 and 20,000 cycles per second.

Two important arc welding developments were announced at the Show and discussed at AWS meetings: (1) use of CO_2 as a shielding atmosphere, and (2) low-hydrogen electrodes with coatings containing iron powder, for hard-to-weld steels. Discussing use of the former at an AWS meeting, R W Tuthill of General Electric said its chief drawback, erratic arc action, can be overcome by using a short-arc technique and a constant arc length that won't change as the welding current changes. A high, hot, penetrating arc is preferable, he said, as is a high current density of 100,000 to 200,000 amp per sq in. A job that may cost $5 per hr for argon shielding, can be done with CO_2 for 25¢ an hour, he said.

Two exhibitors announced portable consumable-electrode, inert-gas arc-welding equipment, said to achieve higher welding speeds and better welds at lower costs. One maker uses coated wire as the electrode, the other uncoated wire. This process can replace submerged-arc welding in some instances, they claim.

Also shown in the welding field were rectifier-type DC arc welders in 300 and 400 amp models; 300, 400 and 500-amp transformer AC arc welders; an air-cooled, gasoline-driven lightweight generator-type arc welder of 20-220 capacity; a multi-torch, medium-area oxyacetylene shape cutting machine that can be used with manual, magnetic or electronic tracers, will support up to 4 cutting torches, and cuts 6-in. steel plate; and a portable electric oven that maintains continuous 275 F heat flow to protect welding rods against moisture in arc welding.

Two exhibits of electrical discharge machining drew large crowds. One maker showed machines equipped for "grinding" and "drilling" to precision tolerances. The other showed a Swiss unit first exhibited at the recent Milan Fair.

(Continued on next page)

for High-Pressure Couplings

Turning . . .

ENDS ARE FACED SQUARE by forward spindle. Then major diameter of thread is turned, gasket seat is contour-turned, and shoulder is squared—all to 16 mu. in. rms. One end of pipe has male gasket seat: other end is for female

Threading . . .

LANDIS DIE-HEAD (adjustable from 6 to 8 in.), mounted on rear spindle, chases an 8-pitch, Class 3 thread at 5 rpm spindle speed, holding an average surface finish on thread profile of 63 mu. in. rms. Every thread is checked

METALS SHOW (Continued)

One maker introduced a line of 60-cycle induction heaters for forging billets. Another showed a 5-kw induction generator connected to a recently developed (*AM* Oct 25 '54 p117) tooth-by-tooth gear hardening fixture that will heat treat gear teeth from 2½ to 15-in. OD with up to 4-in. face width, and 12 to 4 DP. It also can be tooled to heat treat rack teeth.

Among domestic and foreign machine tools and accessories shown were a 14-in. drill press, an 11-in. metal cutting lathe, and pneumatic feed units for small drill presses.

Parts "machined" by chemical milling (*AM* Sept 13 '54 p200) were shown by a maker of chemical processing compounds. A number of exhibitors showed improved quenching oils, and one firm demonstrated a room-temperature metal cleaning solution claimed to cut heating expense, cut fire hazards, and inhibit rust. Another firm exhibited a transparent grinding coolant that can be drained to public sewers or nearby streams without contaminating them.

Several producers displayed new and improved titanium alloys, and one firm showed titanium tubes in a variety of sizes. A paint company demonstrated an anti-galling coating that prevents seizure when threaded titanium parts are stressed against titanium, steel or other metals. Watertown Arsenal displayed several Ordnance parts made from titanium, and another exhibitor showed techniques for making titanium parts with powder metallurgy.

Another unit, a new ultrasonic machine, employs vibrational energy with controlled abrasive action to form shaped holes in hard or brittle materials. Unlike the electric-discharge machines, this unit can form holes in electrically non-conductive materials.

SCHARMANN OF GERMANY FORMS US SUBSIDIARY

NEW YORK — Scharmann & Co, Rheydt, Rhineland, Germany, manufacturers of horizontal boring and milling machines since 1884, has set up the Scharmann Machine Corp in the United States.

Distribution Only

Incorporated under New York laws, Scharmann's US firm will have its offices at 305 West 72nd St, New York 23, and an eastern district office at 337 Boulevard of the Allies, Pittsburgh 22. The new corporation will not manufacture the Scharmann line, but will handle US distribution of a complete line of standard horizontal boring and milling machines in spindle diameters ranging from 2½ to 5 in. in floor, table and portable types, plus tooling and accessories.

TOOL AND DIE BUSINESS: "Good but Competitive" Is NTDMA Consensus

High income taxes are strangling small and medium-size US business, Commerce Dept official tells NTDMA annual meeting —and an Association survey bears him out. But the outlook for the next few years has its bright side, too

DAYTON, OHIO—Today's income tax laws, with graduated rates up to 91%, are a threat to US free enterprise. That's the opinion of Lothair Teetor, Asst Secretary of Commerce for Domestic Affairs, speaking at the National Tool and Die Manufacturers' Association's ninth annual meeting here November 4-7.

"Big business," he said, "is not gobbling up smaller business. They are selling out because they want to . . . the only way to cash in on a lifetime of work without giving the bulk to the tax collector. This trend is not good for business, labor or the nation. Too few individuals have a desire to invest their savings in new ventures, and business is becoming concentrated in the hands of fewer and fewer."

But, Mr Teetor said, several barometers indicate business will be good in the foreseeable future: (1) current unemployment is below 1949-50 averages, (2) personal income for the first nine months of 1954 hit an all-time high, (3) third quarter 1954 construction was the highest in history, (4) steel output is rising, and (5) auto output is increasing.

NTDMA's recent survey of tool and die company activities bears out Mr Teetor's statements, it was reported. Findings indicate good but highly competitive business during the fourth quarter.

Subcontract Freeze-Out?

Retiring President Herbert C Murrer, discussing the effect of the war-to-peace transition on tool and die-making, said "There has been a tendency for large prime contractors to withhold subcontracts from tool and die shops in favor of their own tool-making departments." But he said, the industry doesn't want government priming, preferring to "get out and sell labor-saving ideas and devices to the production industries."

Planned public relations pays off, W Y Conrad of Monarch Machine Tool Co told the meeting, in this way: you get your share of the business, you get the pick of job applicants, you have lower turnover, better ouptut, good morale. Mr Conrad outlined a program of employee, customer and community relations applicable to even the smallest tool and die shop.

In the same vein, Jack Kleinoder of John Volkert Metal Stampings Inc, told what his firm had done in this field: personalized birthday cards to all employees, visits by supervisors to hospitalized employees, landscaping the plant grounds, and production of a color film that "takes the plant to its customers."

First Annual NTDMA Public Relations Grand Award went to the Cleveland Tool Die & Machine Shops Association for notable group public relations during 1953-54. Awards of Merit went to the Southern California Tool & Die Association, the New Jersey Tool & Die Manufacturers' Association, and NTDMA's Detroit Council.

See p170 for new NTDMA officers.

Washington's Industrial Influx

"Git there fustest for the mostest"* is the thinking behind industry's new trend—setting up plants right at the source of lucrative government contracts

* With apologies for misquoting General Nathan Bedford Forrest, who didn't say it that way in the first place

WASHINGTON — Defense contractors are finding it pays to have a plant or an office in or near the nation's capital and its sprawling Federal agencies—all potential buyers of products ranging in price from 10¢ to $10 million.

Take a case in point—Fred S Gichner Iron Works, a small metalworking outfit right in the heart of Washington. Before WWII, Gichner was a fabricator of ornamental iron items used primarily in the home building field.

When the war came along, he and a lot of other manufacturers of his type were faced with having their supplies of steel, iron, aluminum and other metals "controlled" right out of their possession. So, he decided to sell to the government. The first major job his company got was from the Navy, making fins for some 75,000 British-made rockets. Later contracts found Gichner manufacturing aircraft bomb racks, 40 mm ammunition racks, cable reels for anti-submarine warfare, aerial gunnery training seat devices, and many others.

"Like to See What They're Buying"

Mr Gichner says his success is based on this fact: government procurement officers like to see what they're buying during the process of manufacture. "We're less than 20 minutes away from 90% of all the government buyers," he adds.

His firm has just won a $1-million Navy order for 130 firefighting trucks for airport use. Production of the first pilot line model will be completed this week and the company is confident that it will be able to step up output to 12 a month by January. Chassis of the truck is Chrysler-built.

This kind of rapid-fire consultation with the military has become a trend as more and more companies —big and small—are finding it wise to have scientific and engineering talent in an office in or near Washington.

There are reasons, too, other than being near a source of business. For one thing, engineering and scientific talent can be recruited in Washington—and engineering and scientific laboratories in Washington are a prime source of new ideas for the company's own staff.

Since the war at least 40 companies, by one count, have established plants in the Washington area —either for research and development, pilot production, or complete production. They include a large number of firms in metalworking, electronics, metallurgy, guided missiles, fuels, chemicals and plastics, tools and dies, instruments and acoustical products.

One of the new arrivals in metropolitan Washington is American Car & Foundry Co's Electronics Division. The company, whose main plant is in New York, set up a plant in January of this year at Alexandria, Va, just across the Potomac from Washington.

ACF Electronics Manager J G Reed says the primary reason for his company's new plant is that Washington "is probably the greatest center of research and development in the world." And, he says, scientists and technologists prefer an environment inhabited by others of their kind. Thus, the problem of attracting and retaining highly talented people is appreciably simplified if the environment is appealing in the professional sense.

Mr Reed adds that "it stimulates the productivity of the technical individual, and we are now confronted with the fact that the lines of demarcation between the various fields in science are rapidly blurring. One field overlaps another, and often several others."

Melpar Inc is a firm that began research into electronics programs for the Air Force and the Navy less than 10 years ago. Incorporated virtually on a shoestring and an idea, it has expanded more than 100% since its inception. Now Melpar and the parent organization with which it has merged, Westinghouse Air Brake, are completing a $10-million research facility in Virginia, less than 10 minutes from the Pentagon. Melpar's headquarters in Alexandria, too, are less than 10 minutes away from Navy and the Pentagon.

Another example of the Washington trek is the five-year-old Atlantic Research Corp, which today has electronic contracts for more than $1 million from the Air Force and Navy.

There are many others—Emerson Electric, Geophysical Instruments, Timber Engineering Co, Engineering & Research Corp, Reed Research, Jacob Instrument Co, and Intelligent Machines Research Corp, to name only a few.

Resident Technical Staffs

Besides these, giant engineering staffs of large corporations are located in or near Washington, such as those of General Motors, General Electric, Westinghouse, Douglas Aircraft, Boeing, Convair and its parent, General Dynamics.

Convair for example maintains a Washington engineering staff ready to trouble-shoot any of Convair's multiple aircraft, guided missile and electronic projects. Moreover, Convair experts in specific fields—on an average of 25 a week—are brought in. They're becoming as familiar with Washington agencies as they are with their home plants across the nation.

General Electric has a staff of more than 200 in Washington, plus about 20 GE technical and management experts who check in and out of Washington on an average each day—enroute to conferences at the Pentagon, at ARDC in Baltimore, at the Naval Research Laboratory and other US offices.

Competition for government contracts is becoming keener as the threat of war lessens. The Washington pendulum is swinging from emphasis on production to research and development of better equipment. And it's beginning to look like the golden pendant is going to the firm that's right on hand to catch it.

E P Cunningham

Albert Clements

Carl J Ricker

Names in the News . . .

E P Cunningham has been named vice president, sales, of Clearing Machine Corp, Division of US Industries. A member of the staff since 1934, Mr Cunningham headed the Detroit district sales office, and has recently been serving as general sales manager. **Albert Clements,** manager of the Hamilton, Ohio, plant, has been named to head it as vice president. Mr Clements was chief engineer of the Chicago division before moving to the Hamilton facility in 1952.

T J Ault has been elected president and general manager of Borg-Warner Corp's Long Mfg Div in Detroit. **J Rodger Dryden,** who formerly headed the company, has been named chairman of the board to succeed **J Lester Dryden,** who is retiring. Mr Ault will continue for the present to hold the post of president of the Detroit Gear Div.

W S Rheem II has been elected president, and **Frank G Fisher** vice president and general manager of US Spring & Bumper Co, South Gate, Calif, a division of Rheem Mfg Co. **John B Rauen, Sr,** former president, has been named chairman of the board.

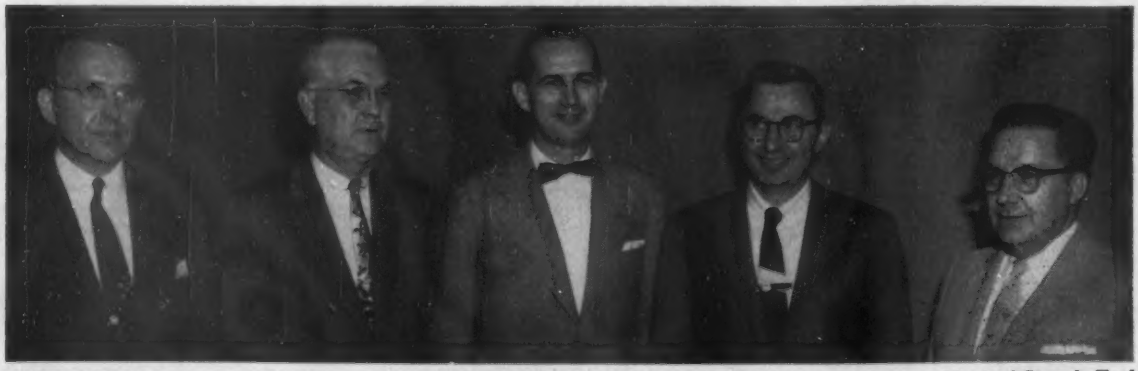
Elmer W Bernitt has been made vice president in charge of manufacturing and procurement for the automotive division of American Motors Corp. He joined Nash Motors in 1938, and served as general works manager at Kenosha, Wis, for the past six years. Mr Bernitt will make his new headquarters in Detroit.

William Hagel has been appointed vice president and executive assistant, United Engineering & Foundry Co. **Clark H Johnson,** manager of machinery sales, succeeds Mr Hagel as vice president in charge of sales.

Carl J Ricker has been appointed chief sales engineer of E W Bliss Co's Hastings Div, replacing **Guy Prettyman** who retired recently. Mr Ricker has been associated with the company for the past 20 years as head of parts sales and engineering at the Hastings, Mich, plant.

Charles D Shannon has been elected president of the P O McIntire Co, Cleveland manufacturer of POMCO boring and reaming tools; he succeeds **Sam J Forbes,** named board chairman. **Alfred G Goglin,** former superintendent, has been named to take over Mr Shannon's post as vice president and general manager.

Lester J LaMack has been appointed sales manager of Dumore Precision Tools, Racine, Wis. A member of the staff since 1925, Mr LaMack has most recently managed Motor Div sales. **Herb Ainsworth,** formerly district sales manager in St Louis, has been named to head the Detroit office.



National Tool & Die Manufacturers Association's 1954-55 officers, elected at the recent annual convention, are (left to right): Philip R Marsilius, vice president of Producto Machine Co, Bridgeport, Conn, treasurer; Joseph N Huser, president of B & H Specialty Co, Indianapolis, first vice president; Jerome H Stanek, vice president of Stanek Tool & Mfg Co, Milwaukee, president; Herbert Harig, vice president of Harig Mfg Corp, Chicago, second vice president; Harold G Murdock, vice president of Arrowsmith Tool & Die Corp, Los Angeles, secretary

Brent C Jacob, Jr

Joseph H Humberstone

Carl W Petersen

Brent C Jacob, Jr, has been appointed chief industrial engineer of the Chrysler Division. Since 1945 he has served in the research design section of the central engineering division, and has held the posts of quality control and quality inspection supervisor on the staff of the operating manager. **Raymond E Hewlett** has been named staff project engineer. For the past 19 months he has been general works manager of the Chrysler Tank Engine Div, operating the Army's Michoud Ordnance Plant in New Orleans, La.

James P Haight has been named to the newly-created post of chief engineer of Aluminum Co of America. **John L Patterson** succeeds Mr Haight as general manager of the fabricating division.

Joseph W Mueller has been appointed works manager of Nash Motors' Kenosha, Wis, plant; he was formerly assistant manufacturing manager of Kelvinator Div. Mr Mueller has been with Nash manufacturing divisions for 25 years, serving as plant engineer at the Milwaukee and Kenosha plants; assistant works manager at the Grand Rapids, Kelvinator unit, and assistant production manager in Detroit.

Joseph H Humberstone, president of Air Reduction Sales Co, New York, has been elected president of the American Welding Society. **J J Chyle,** director of welding research for A O Smith Corp, Milwaukee, Wis, has been named first vice president; **C P Sander,** general superintendent, Vernon, Calif, plant of Consolidated Western Steel Div, US Steel Co, was elected second vice president.

Clyde C Williams has been elected vice president, sales, of Chrysler Corp's Marine & Industrial Engine Div. Associated with the organization for 26 years, Mr Williams was appointed manager of marine sales in 1946, and general manager of the division in 1950.

Jervis C Webb, president and general manager of Jervis B Webb Co, Detroit, has been elected president of the Conveyor Equipment Manufacturers Association. **Fred S Wells,** vice president of Stephen-Adamson Mfg Co, Aurora, Ill, is new vice president of the association; **R B Maas,** president and general manager of Screw Conveyor Corp, Hammond, Ind, secretary; and **E E Boberg,** sales manager, Standard Conveyor Co, North St Paul, Minn, treasurer.

Carl W Petersen has been elected vice president and works manager of Dodge Mfg Corp. He succeeds **Edgar M Carver,** who is retiring as a member of the board, and as a first vice president. Mr Carver will continue to serve as a member of the board, and as a consultant. Mr Petersen joined Dodge in 1923; he was appointed assistant superintendent in 1939, and has been general superintendent since 1942.

Bert H McGill has been appointed president and general manager of Eclipse Fuel Engineering Co of Canada, Ltd, Toronto. Mr McGill, vice president and general manager of Toronto Hardware Mfg Co, Ltd, will plan and direct Eclipse's building and expansion programs in Canada.

Ronald D Gumbert has been elected president and a director of Alloy Precision Castings Co, Cleveland; he has been serving as executive vice president for two years.

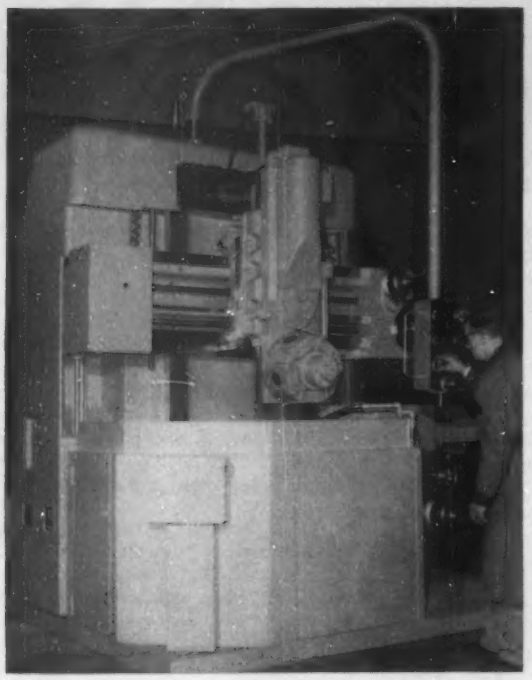
Orello S Buckner, president of Bay State Abrasive Products Co, Westboro, Mass, has been elected chairman of the board of the Grinding Wheel Institute. Mr Buckner has headed the Institute's research projects committee for the past year.

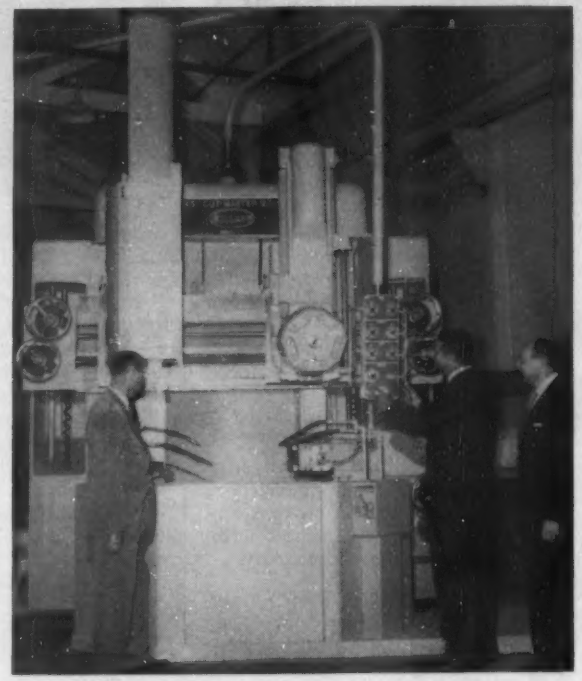
Joseph W Mueller

Jervis C Webb

Orello S Buckner

New Shop Equipment,





Cut Master 75 machines with 26-in. capacity (left) and 46-in. capacity (incorporating swiveling ram head) are part of complete line of ...

Redesigned Bullard VTL's Providing Unique...

The Bullard Co of Bridgeport, Conn, recently demonstrated its new line of Cut Master 75 vertical turret lathes. There are six machines with capacities ten inches apart, ranging from 26 to 76 in. All have sixteen feeds in the range from 0.00065 to 0.125 in.

The two smaller machines can be furnished with a choice of hand- or power-indexed turret head, and with RH octagonal ram head and RH sidehead. The larger machines can be furnished with several combinations of heads selected from LH octagonal ram, RH octagonal ram, hand- or power-indexed turret head, and RH side head. The ram head swivels 30° left or right of center; side head is non-swiveling. All heads have feed works mounted within the bed and provide screw feed and traverse in all directions.

Improvements in the design of the Cut Master include, in addition to greater rigidity and capacity, simplification of both operation and maintenance. This has been accomplished while developing a machine whose hydraulic and electrical installations conform to JIC standards and which presents clean, streamlined exterior lines.

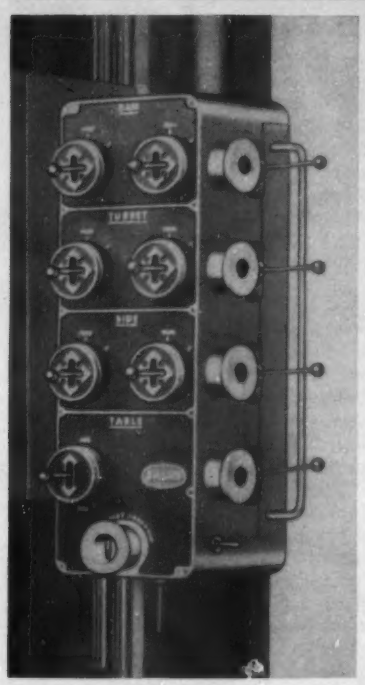
Of greatest interest is the hydraulic shifter unit which makes it possible to control all functions of the machine from a single, movable pendant station. The design of the pendant itself is unusual in that it does not use pushbuttons, but small directional levers.

Each head has a correlated feed and traverse lever on the pendant. By directionally engaging the feed levers, singularly, or in combination, a continuous sequence of longitudinal, cross, or 45° cutting operations can be quickly controlled. Mechanical interlocks prevent cross engagement. A direct-reading feed rate selector dial is provided for each head. Feed rate selection is independent of speed selection. Table rotation is controlled by a single jog and run lever. Extending from the bottom of the pendant is a sensitive stop-all lever.

The hydraulic shifter unit consists of an independent self-contained hydraulic oil reservoir and cross-drilled aluminum pressure plate on which are mounted solenoid-controlled cylinder units for all feed and speed changes. The design simplifies maintenance problems by obviating hydraulic tubing and connections. The paired cylinder units are interchangeable components.

Another design innovation is the table support bearing, a combination radial and thrust roller unit. The outer race of the radial serves as

Materials and Parts . . .



DIRECTIONAL LEVERS, moved vertically, horizontally, or at 45°, control all functions. Pendant may be raised or lowered by power and manually moved in 180° arc

Pendant Control

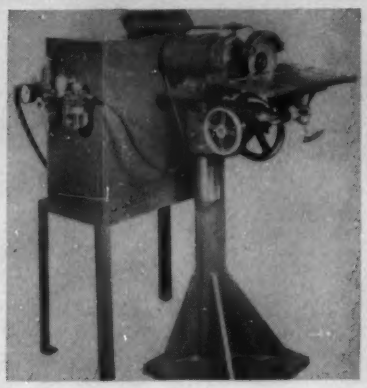
the upper race of the thrust. The diameter of the bearing corresponds closely to the inside dia of the table gear.

Attachments which are available include: hydraulic chucking mechanism, angular turning, thread-cutting and drum-scoring devices, and variable speed drive. The machine can be adapted to single or double dimensional contouring controls.

One other attachment, of great importance, is the Bullard Man-Au-Trol, which may be purchased with the machine or added in the field. It converts the Cut Master 75 to a completely automatic machine.

The attachment consists mainly of two rotary detectors and a function drum, both being electrically operated and controlled. It will control any function which the machine is capable of performing.

The Bullard Co, Bridgeport 2, Conn



Tool Grinder Provides High-Speed Carbide Removal

A high-velocity, single-point carbide tool grinder, the HI-V operates at 10,800 rpm to combine customary rough and finish grinds into one operation. The result is a cu-in. rate of carbide removal said to be five times greater than possible by conventional methods. The manufacturer states that use of the ultra high speed with a nickel-bond diamond wheel and a special fluid to limit energy absorption in the wheel applies 95% of the total energy developed to the carbide tool face.

Developed jointly by Ohio Metal Working Products, Cleveland, Ohio, and the Metalloid Corporation, Huntington, Indiana, the new machine employs an integral direct-drive motor and precision spindle with high-speed bearings. The motor spindle provides two speeds of rotation with both right- and left-hand use. High speed operation and low speed of 3600 rpm are accomplished by a frequency converter. Controls for the machine are pushbutton operated.

Grinding fluid is applied to the wheel face by means of a Metalloid fixed-volume mist applicator incorporated as an integral part of the grinder. Both the spindle and the wheels are dynamically balanced, to provide operation that is noiseless and free of vibration. The wheels are mounted to the spindle with adaptor bushings which are removed with the wheel. Wheels of 80, 100, 120, 150, 170, and 200 grit.

Ohio Metal Working Products Co, 1836 Euclid Avenue, Cleveland 15, Ohio

. . . including

Electrical discharge machine redesigned to provide greater precision . . . . . page 174

Tracer control, multi-cycle, for line of automatic lathes page 175

Nutsetter, electro-pneumatic, automatically sets ten bolts page 176

Heavy-plate shear does production shearing of steel plate to 8 ft long by 1½ in. thick page 178

Honing machine and coolant unit has beltless speed changes from 400 to 1000 rpm page 184

Milling machine incorporates head which may be set in any of three planes . . . . . page 188

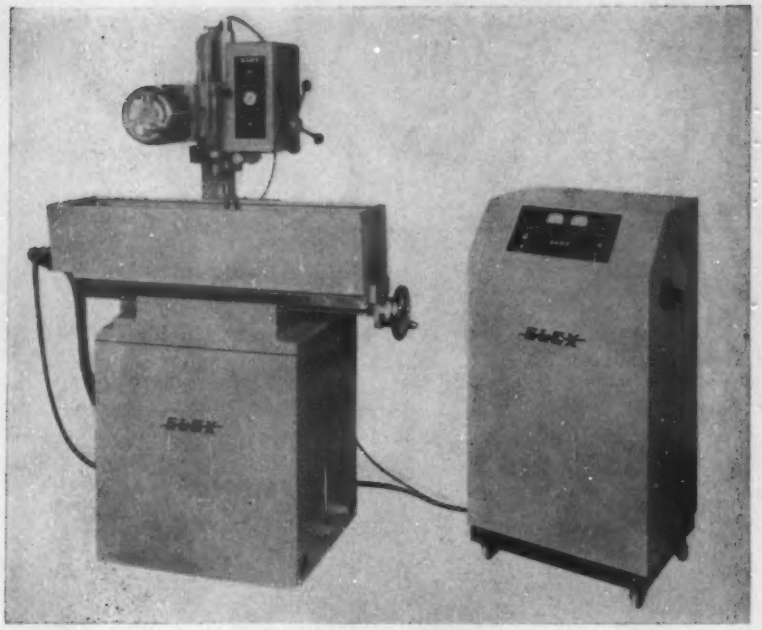
Multiple-station transfer machine requires only tooling to perform various operations page 190

Slide feed, cabinet mounted, has independent motor drive with no connections to press page 192

. . . and in Dec 6

Automatic hobbing machine has feed, index, and hob speed mechanically governed.

Horizontal milling machine has overarm to convert for vertical work.



Electrical Discharge Machine Designed for Flexibility

The M-500 has been designed by Elox Corp and Cincinnati Milling Machine Co to meet need for tool to complement precision of electrical discharge machining. Over four years of research are behind the M-500.

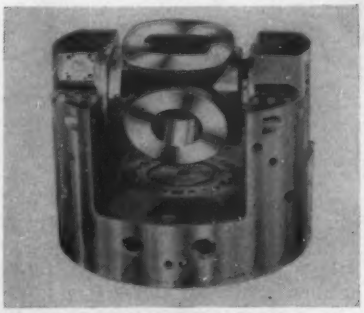
Dual coolant supply consists of high-pressure pump and separate high capacity pump for quick filling of oil reservoir. A 9x15-in. movable bolster plate is incorporated. The specific design of the work-pan mounting provides use of the entire table area which is 10x42 in. The 9x15-in. insulated plate is movable over the entire work area.

Machine has heavy cast frame construction with micrometer adjustment of longitudinal feed, head cross-feed, and head vertical feed. It has been designed to accommodate a great range of sizes without loss of accuracy.

Of particular interest is the 9½-in. travel in the lapped-in quill. The quill accuracy is of extreme importance in the manufacture of precision die cavities of considerable depth. The table and head move on hand-scraped locking V-ways. The machine tool is mounted on a heavy base constructed of No. 8 gage steel plate to prevent warping of the mounting table. The machine is designed for floor mounting with levelers. The base is of all-welded construction.

The oil reservoir and pumps are mounted entirely within the base and slides have been provided for easy removal for cleaning and maintenance. This design minimizes the floor space required and yet provides for ease of operation. All operating levers are external and within reach of the operator. The automatic feed is disconnected by a simple push-pull operation allowing for quick handwheel adjustment of the electrode relative to the work.

Elox Corporation of Michigan, 740 N Rochester Rd, Clawson, Mich



Two-Jaw Indexing Chucks Handle Special Pieces

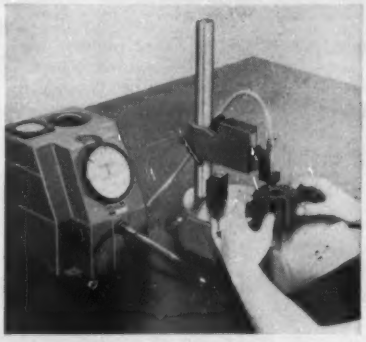
Two-jaw power or scroll indexing chucks have been designed for holding pieces having opposing and angular surfaces in specific relation to one another, thereby permitting precision machining of all faces without having to unload and re-chuck the work. The chuck body has two arms extending outward from face on which are mounted special master jaws. These jaws are actuated by levers and move in and out in relation to center of chuck face plane. Centered on master jaws are revolving jaws which rotate at right angles to master jaw action. Formed jaws which actually hold the work are fastened to the revolving jaws.

Chucks for this type of work require unusually deep throat and extreme care has been taken in design to assure rigidity at points of possible stress. Point of contact between jaw operating levers and master jaw is in line with jaw ribs in body. Superimposed on each master jaw is a revolving jaw on ball bearings which rotates at right angles to master.

On top of one of the master jaws is the indexing mechanism permitting operator to rotate revolving jaw holding the work to next machining position with positive indication. The indexing pin engages slots in the periphery of the revolving jaw.

The opposing revolving jaw, not indexed but on ball bearings, has a compensating action to allow for out-of-roundness. Lever action to master jaws is transmitted from draw bar by toggle linkage.

Cushman Chuck Co, Hartford, Conn

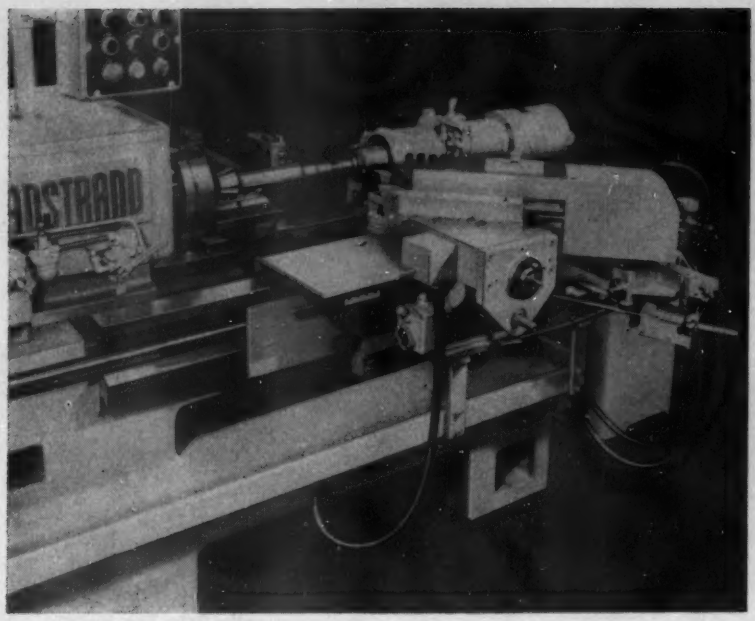


Universal Gage Head For Air Gaging

AirProbe for use with Dimensionair air gage can be mounted on a variety of fixtures and can be applied to regular Federal gages. Spindle-like device, no larger than a cigarette, is accurately calibrated and requires no tolerance-setting masters. Available ranges are 0.003, 0.006, 0.015, and 0.030 in. Approach travel is 0.031 in.; spindle travel 0.140 in., and overtravel from 0.070 to 0.100 in.

All AirProbes have same shape and physical dimensions.

Federal Products Corp, 1144 Eddy St, Providence 1, RI

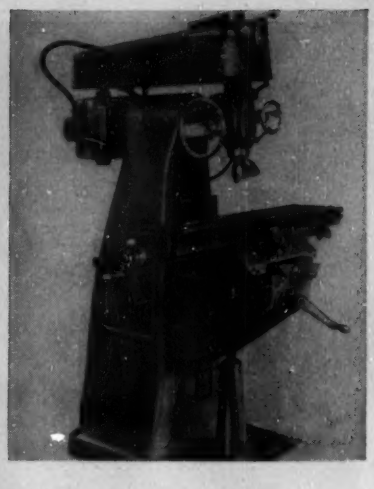


Multi-Cycle Tracer Control For Sundstrand Automatic Lathes

For multi-cycle single-point turning of irregular shapes, Sundstrand automatic lathes can be provided with a templet-controlled tracing slide mounted to the regular front carriage. With this attachment and controls, rough, semi-finish, and finish cuts can be taken with one turning tool in one automatic cycle. Only one templet is required for all three cuts. The machine can be set up for one, two, or three cycles. The regular crossfeeding rear slide can be used to square up shoulders and chamfer.

Cycle changing is quick and easy —requires only 5 to 15 minutes depending on job and number of facing tools to set up. This attachment is available for factory installation only on new lathes. Maximum length of cutting stroke is 20 in.—actual length is dependent on bed of machine and shape of cut.

Sundstrand Machine Tool Co, 2531 Eleventh St, Rockford, Ill



Vertical Milling Machine Has Been Redesigned

New model incorporates six improvements which increase the convenience and accuracy of the balanced head milling machine. Among improvements are: relocation of vertical feed handle for greater convenience; addition of a micrometer dial.

Machines have a hard chrome-plated quill which is carried in the precision bored and honed head. A new draw bar speeds tool changes and protects the tools. Tightening or loosening a single nut sets or releases tools from spindle taper. A permanently secured plate above the knee gears has been added to the conventional telescoping chip guard.

New optical accessories have also been announced. Among these are: hardened and ground lead screws guaranteed to have a combined maximum runout over the entire length within .0005 in.; a longitudinal power table feed which is instantly reversible and infinitely variable (while in operation) between 0 and 12 ipm.

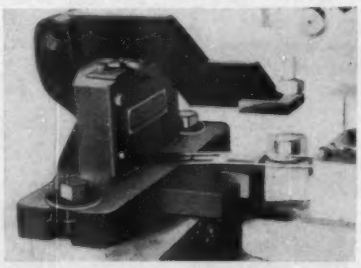
The US Burke Machine Tool Div, Brotherton Rd, Cincinnati 27, Ohio

Gas-Fired Homocarb Furnace And New Control Devices

Series 60 line of automatic temperature controls, to be demonstrated with Speedomax Type H indicating controller, provide 50% reduction in panel space, continuous indication of valve position, and stepped up rate action and reset response.

Gas-fired Homocarb furnace has Microcarb atmosphere control which provides advantages of forced circulation, uniform atmosphere, and automatic control of both temperature and carbon potential. Completely piped and wired Safe-Start burner control unit combines all gas and air valves, safety interlocks, blower, and other accessories in one pre-engineered assembly.

Leeds & Northrop Co, 4444 N 16th St, Philadelphia 30, Pa



SCRAP CHOPPER powered by press ram clamps to any press bed and handles steel up to 3 in. wide and to 0.062 in. thick. Unit is independent of the die and prevents lost production time because a spare blade can be installed when cut-off blade needs sharpening. Unit is guaranteed to work on any job within limits specified — *Jaco Devices, Inc, 90 High St, Hingham, Mass*

High-Viscosity Silicone Fluids

GE has developed a family of high-viscosity silicone fluids, designated Viscasil, said to exhibit a smaller change in viscosity at temperature extremes than any currently known. They are reportedly stable even when exposed to 300 F for thousands of hours.

Successful use in fluid couplings, torsional vibration dampers, shock absorbers, and similar applications, has established their high resistance to mechanical shear breakdown.

General Electric Co, Silicone Products Dept, Waterford, NY

Automatic Power Saw Uses Hydraulic Controls

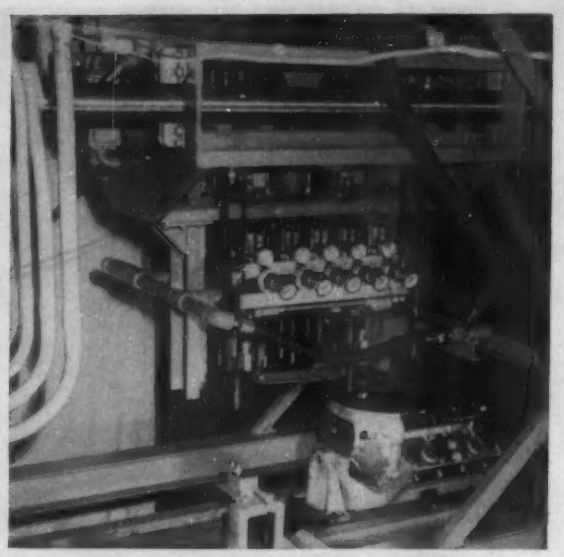
First DoAll horizontal power cut-off saw incorporates adjustments and hydraulic controls for feed pressure, band tensioning, and infinitely variable speed changes.

Standard automatic indexing affords production of blanks up to 24 in. long. The HSS saw band is reported capable of accepting greater work loads.

Saw head panel provides control of: up or down direction of saw head; sawing pressure (thereafter hydraulically maintained); blade speed; rate of coolant flow; and automatic or manual indexing. Machine accepts rounds to 12-in. dia and rectangular bars up to 12x20 in.

Automatic stock-indexing table can be added to basic saw to adapt it to full automatic operation.

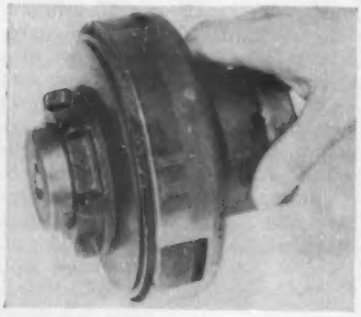
The DoAll Company, 254 N Laurel Ave, Des Plaines, Ill



Electro-Pneumatic Nutsetter Automatically Sets Ten Bolts

Ten-spindle unit sets ten bolts on V-8 engine cylinder block. Nut runner is powered by ten air motors and self-supported by steel framework. Blocks are fed in on conveyor at 2000 per hour. After being centered by fences and rollers, it triggers nut running unit which lowers and is positioned by pilot pins. If pins don't locate properly, triggers in pin nose actuate machinery to withdraw unit from that particular cylinder block.

Reed Roller Bit Co, Cleco Div, Houston, Texas



Torque-Limiter Coupling Units

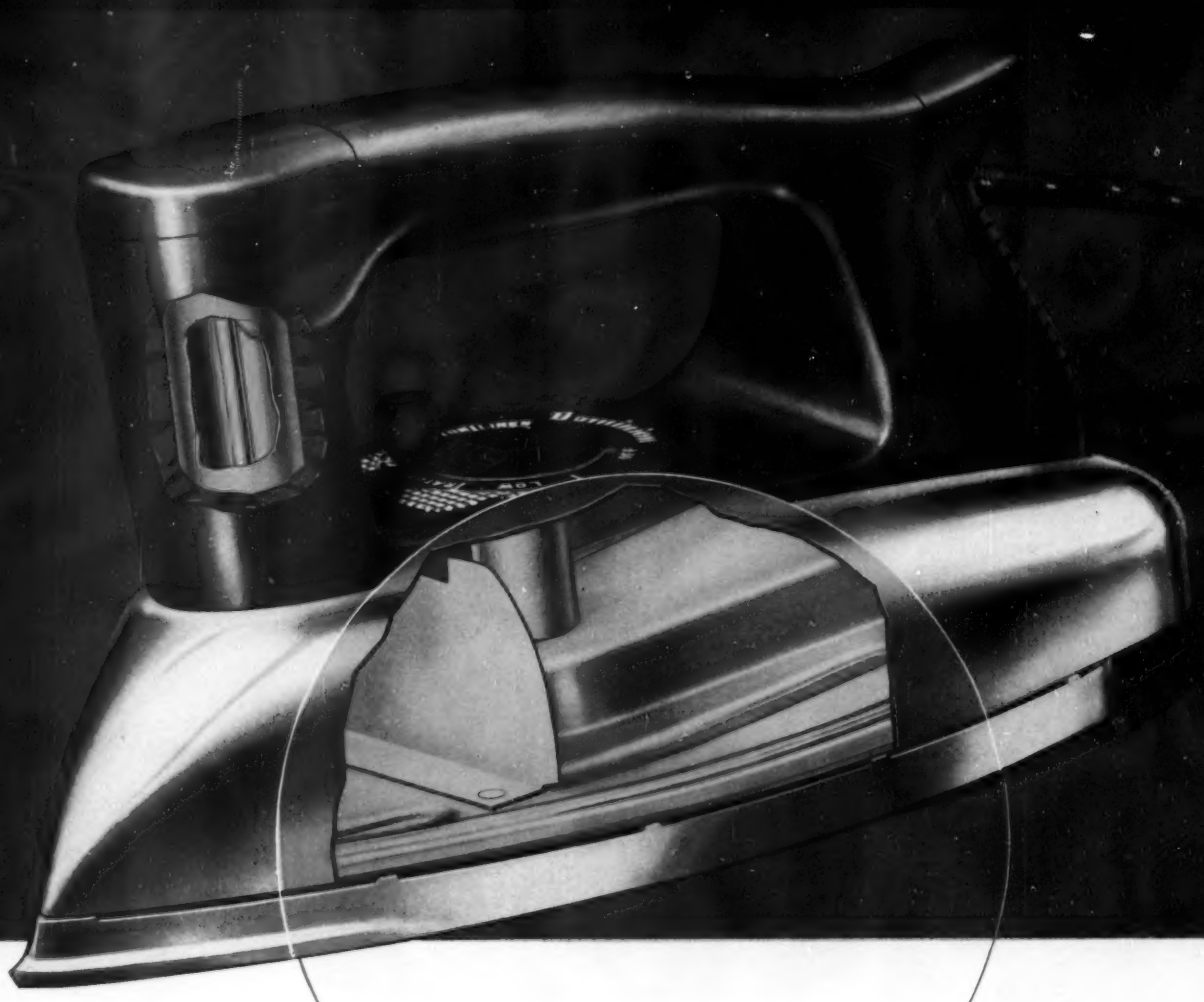
Adjustable Torque-Limiter coupling units that provide overload protection for a wide variety of machinery drives with direct-connected shafts combine the features of an adjustable slip-clutch overload device with those of a flexible coupling. Units are reported ideally adaptable to motor drives with torque loads up to 260 ft-lb. which include a direct-coupled motor or motor and speed reducer combination.

A flat molded friction disk with three integral lugs is clamped between two steel driving plates by the action of a Bellville spring tensioned by an adjusting nut. Driving plates are splined to a steel hub. Hub supporting the Torque Limiter components is keyed to the shaft. Flexible coupling action is achieved by meshing the lugs on the OD of the disk with the slotted steel cup keyed to the shaft.

Morse Chain Co, 7601 Central Ave., Detroit 10, Mich

ELECTRIC TRUCK, Model J, is battery-powered and will carry up to a ton at speeds of 5 to 6 mph. It can be equipped with four removable air cushion seats for plant tours. Deck area is 15 sq. ft., deck height 9½ in. Turning radius is 77½ in — *Lewis-Shepard Products, Inc, Dept R-50, Watertown, Mass*

LOW-LIFT PILOT TRUCK, narrow-aisle, rider-type with 8 load wheels arranged in dual, tandem fashion is reported to have sufficient wheel bearing surface to substantially reduce both wheel and floor wear. Each wheel has a diameter of 3¼ in. and a face of 2¼ in. Wheels are articulated to insure contact with floor at all times and wheel supporting levers are so arranged that wheels lift almost vertically — *The Raymond Corp, 47-123 Madison St, Greene, NY*



Peek under this gleaming chromium plate

and see functional, durable, BRASS at work

In adding a combination steam-and-dry iron to its list of electrical appliances, The Dominion Electric Corp., Mansfield, Ohio, set its goals high. The iron had to be engineered, styled and priced so as to be readily salable in a highly competitive market.

1 Costs *must* be kept down – without sacrificing quality.

2 The iron *must* be light in weight (actually 3¼ lb.) and provide a long service life.

3 It *must* operate unfailingly – anywhere – on ordinary, undistilled tap water.

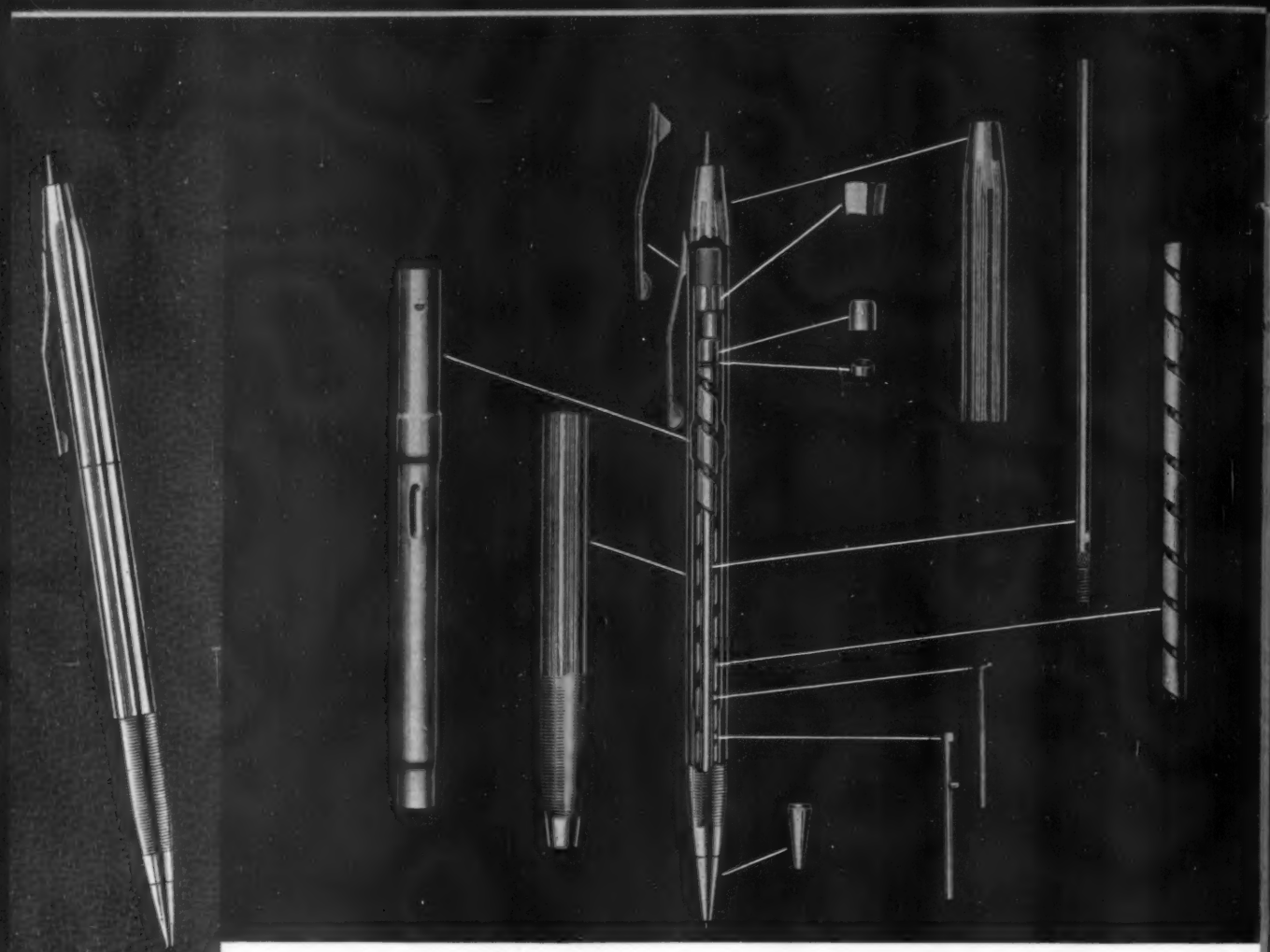
For the housing, steam generator, filler tube and miscellaneous supporting members, BRASS was the answer – as it so often is where freedom from rust, resistance to corrosion, workability and ease-of-finishing must be coupled with moderate cost.

We are glad to report that Dominion's choice and extensive use of Anaconda Brass paid off handsomely; also that we were able to give their engineering and production staffs an assist in selecting the right compositions and the most economical gages and tempers. Perhaps we can do the same for you? Simply write The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. B489

ANACONDA

the name to remember in

COPPER • BRASS • BRONZE



CROSS put an end to automatic pencil troubles **with BRASS**

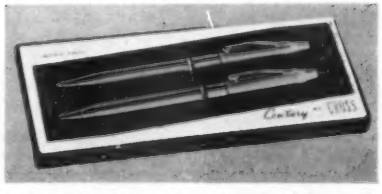
Since 'way back in 1846, America's oldest manufacturer of fine writing instruments—the A. T. Cross Pencil Company, Providence, R. I.—found out that you can do things with brass that you can't do with any other metal. And they've been doing it ever since.

Illustrated above in actual size are an even dozen parts that make up the chromium plated Cross Pencil. All, except the spring clip of phosphor bronze, are made of brass supplied as sheet, strip, wire, rod or tube.

Note the multiplicity of fabricating operations—from the free cutting brass point to the strip-wound spiral – and you'll come to the conclusion that brass gives you the most "easy workability" for your money.

And the man who owns a Cross Pencil —or Pen—is far less apt to fume or fuss. He's got a writing instrument that's tops in quality at a moderate price, with parts that resist wear and corrosion . . . that won't rust, gall or "freeze."

Dependable brass is plentiful—and unrestricted. The days of substitutes are over. Next time the man at the drawing board looks up and says "What'll it be," say "Make it brass." Better yet, say "Anaconda Brass." The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.



In the exploded view, above, is featured the pencil of the A. T. Cross Chromium Plated Pen and Pencil Set. All parts, including those in the pen, are made of Anaconda Alloys supplied by The American Brass Company since 1913. Cross also uses the same "inside working parts" in two "Century" Pen and Pencil Sets in which the caps, barrels and clips are available in either sterling silver or 1/20 12K gold-filled (illustrated above).

ANACONDA

the name to remember in

COPPER • BRASS • BRONZE

FYI
FOR YOUR INFORMATION

FREE Catalogs, Booklets, Charts, Calculators

FYI—these initials symbolize information that's important. And there is much of importance in the literature listed here. To get the ones you need, all you do is fill out one coupon for each booklet you wish to order. Indicate in the circle on the coupon the number of one catalog wanted. When you have filled out a card, detach, stamp, and mail. We'll do the rest.

MACHINES AND ATTACHMENTS

1 MULTI-CYCLING COPYING LATHE—*H E B Machine Tools, New York 17.* 6-page folder contains detailed information on automatic Pilot lathe. Variety of applications illustrated; specifications included.

• AUTOMATIC SHELL THREADER—*Waterbury Farrel Foundry & Machine Co, Waterbury, Conn.* 4-page circular 322-EL-2 describes inclined unit for use in connection with an eyelet machine or independently. Construction, operation, drive, and tooling discussed and illustrated. Request direct on company letterhead.

2 PRESSES—*Cleveland Crane & Engineering Co, Wickliffe, Ohio*—8-page illustrated catalog 2018 describes line of Steelweld two-point, straight-side, tie-rod units of 160 to 500-ton capacity. Detailed specifications provided.

3 BROACHING FIXTURES—*National Broach & Machine Co, Detroit 18.* 11-page catalog covers self-contained Red Ring fixtures for handling smaller parts. Features, applications, illustrated, operational data included.

4 AUTOMATIC MILLING MACHINE—*Producto Machine Co, Bridgeport 1, Conn.* 8-page brochure presents detailed description of versatile production Mill-Matic with rise and fall cutter head slide, and horizontal worktable with integral index mechanism. Tooling illustrated; specifications provided.

5 GRINDING — *Landis Tool Co, Waynesboro, Pa.* 8-page booklet illustrates variety of applications. Contains full-page table of causes and corrections of chatter.

6 MICROHONING—*Micromatic Hone Corp, Detroit 35.* 4-page folder, Vol 6-No. 3, illustrates and describes different combinations of heads, fixtures, fixture tables available on Micromatic machines ranging from simple manually operated to completely automatic machines.

7 MACHINE TOOLS—*Morton Manufacturing Co, Muskegon Heights, Mich.* Bulletins available include: No. 34 on keyseating and slotting machines; No. 37, horizontal boring, drilling, milling unit, and draw-cut traveling head planers; No. 53, automatic special welding machines, fixtures, and auxiliary equipment.

TOOLS AND ACCESSORIES

8 AIR TOOLS—*Rotor Tool Co, Cleveland 22.* 55-page illustrated catalog 38A covers screwdrivers, nut setters, sanders, drills, grinders, rammers, chippers and scalers, impact wrenches. Standard and optional equipment listed, specifications and recommended uses included.

9 MEASURING & TESTING INSTRUMENTS—*W C Dillon & Co, Van Nuys, Calif.* 6-page illustrated bulletin 19-F lists products with specifications and accessories. Includes signals and switches, tester, pressure gage, dynamometer, weight indicator, and thermometer.

10 LUBRICANT—*Sun Oil Co, Philadelphia 3.* Technical bulletin describes Sunoco Way lubricant, especially compounded to eliminate "stick-slip" or jumpy table. Non-corrosive product is said to have excellent extreme-pressure qualities.

11 GAGE BLOCKS—*Jenson Gage Co, Detroit 32.* 19-page catalog illustrates extended line of extreme-tolerance sets, sine bars, tri-squares, and accessory sets. General descriptions and uses, care and maintenance data provided.

12 DATA PROCESSING INSTRUMENTS—*Consolidated Engineering Corp, Pasadena 15, Calif.* 12-page general catalog CEC-1301 furnishes data on complete line, ranging from miniature transducers to entire instrumentation systems. Photographs, specifications, descriptive functional diagrams included.

13 MICRO-FOG LUBRICATORS—*C A Norgren Co, Englewood, Colo.* 4-page folder illustrates unit for air equipment. Features and diagrammatic drawings presented. Specifications given for 20 models in 5 pipe sizes with oil capacities from ½ pt to 4½ gal.

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York Not good after Jan. 22, 1955

FILL IN BELOW NUMBER OF ONE CATALOG WANTED

(duplicate of the above coupon)
(duplicate of the above coupon)
(duplicate of the above coupon)
(duplicate of the above coupon)
(duplicate of the above coupon)
(duplicate of the above coupon)
(duplicate of the above coupon)

FYI
FOR YOUR INFORMATION

14 CARBIDE TOOLS—*Atrax Co, Newington 11, Conn.* 87-page indexed catalog 554 contains complete dimensional and performance data on grinding and boring tools, routers, countersinks, burs, drills, reamers, and mills. Include tables of recommended speeds and feeds, lubricants, maintenance, hardness conversion chart, and case histories.

15 REAMER COMPARATIVE PRICE SELECTOR—*Lavallee & Ide, Inc, Chicopee, Mass.* 19-page booklet covers complete line arranged by decimal equivalents from 0.0400 to 2.0000 in. Size and type data are placed side by side showing models available in standard sizes, with net prices. Each reamer illustrated and described.

16 SCREW HOLDING ACCESSORIES —*Magna Driver Corp, Buffalo 3.* 24-page manual on magnetic devices for power screwdrivers and nut setters. Includes selection tables and operational data.

● DIAMOND GRINDING WHEELS *Action Diamond Tool Co, Chicago 39.* 44-page catalog 55 describes complete line of Jetaline and RoBet resin wheels, and dressers. Request direct on company letterhead.

HEAT-TREATING AND WELDING

17 FURNACE & OVEN CONTROLS—*Minneapolis-Honeywell Regulator Co, Philadelphia 44.* 44-page illustrated condensed catalog and price list 54-1 contains data on Brown instruments and Honeywell controls.

18 METAL QUENCHING—*Gulf Oil Corp, Gulf Refining Co, Pittsburgh 30.* 24-page booklet on Super-Quench dual-action oil. Illustrated with charts and graphs on cooling curves and rates, effect of bath temperatures, agitation curves, hardness penetration curves, and transformation diagrams. Case studies detail solution to tough problems.

19 WELDING STAINLESS TUBING—*Babcock & Wilcox Co, Tubular Products Div, Beaver Falls, Pa.* 4-page folder TDC 162 outlines welding characteristics of both austenitic and ferritic grades, and discusses question of proper joint design. Briefly describes various welding methods; provides table of recommended arc-welding procedures.

20 TEMPERATURE CONTROL—*Burling Instrument Co, Chatham, NJ.* Bulletin 104 illustrates and describes Model D-12 for temps up to 1800 F, where wide and easily adjustable range is required.

PARTS AND MATERIALS

21 ROLLER GEAR DRIVES—*Ferguson Machine & Tool Co, Roller Gear Div, St Louis 31, Mo.* 20-page illustrated catalog 105 describes expanded line for high-speed precision indexing of automatic production machinery. Complete tables on load ratings and dimensions, as well as data and instructions for calculation of loads, designing and installation, and drive selection.

22 ALUMINUM MILL PRODUCTS—*Kaiser Aluminum & Chemical Sales, Industrial Service Div, Oakland 12, Calif.* 24-page illustrated booklet contains data on alloys, forms, properties, applications, and availability; condensed tables and charts.

23 AIR MOTORS & VALVES—*The Bellows Co, Akron 9, Ohio.* 28-page bulletin SP-50 illustrates and describes dimensions and specifications. Charts give size and capacity designations. Accessory items included.

24 CAST STAINLESS ALLOYS—*Alloy Casting Institute, Mineola, NY.* Set of 13 individual data sheets bound in a folder covers properties of all more popular grades of alloys used for corrosion-resistant (stainless steel) castings. Lists chemical compositions, physical and mechanical properties, recommended heat treatments, applications.

25 INSTALLATION ACCESSORIES—*J N Fauver Co, Detroit 1.* 16-page illustrated catalog 17-D contains data, specifications, and prices of accessories for lubrication, hydraulic, steam, liquid, and air applications.

26 ALUMINUM EXTRUSIONS — *Precision Extrusions, Bensenville, Ill.* 12-page circular describes process, lists advantages, covers 6 basic types. Specification table gives physical properties and recommended applications for 14 most generally used alloys; includes tolerance table.

● SPEED REDUCERS—*Brad Foote Gear Work, Cicero 50, Ill.* 24-page illustrated catalog 120 contains revised rating tables of herringbone and spiral bevel-helical line. Tables, selection data, ordering instructions included. Request direct on company letterhead.

27 MOULDED FABRIC BEARINGS—*Gatke Corp, Chicago 1.* 32-page brochure illustrates applications and describes properties of bearings, wear plates, and other parts. Shows products made for grease or oil-lubricated, water-lubricated, unlubricated, and acid-resistant services. Journal sizes to 48-in.-dia and larger.

● REFINISHING STAINLESS—*R G Haskins Co, Chicago 18.* 12-page illustrated manual covers grinding, sanding, polishing, wicking, buffing, and other surface finishing operations. Lists operational instructions, illustrates equipment and accessories. Request direct on company letterhead.

MISCELLANEOUS

28 DIE-CASTING FACILITIES — *National Die Casting Co, Chicago 45.* 7-page illustrated brochure describes machines and facilities. Contains reference chart on composition of zinc and aluminum alloys for die casting, as well as a specific gravity chart.

29 METAL FORMING—*C B Kaupp & Sons, Maplewood, NJ.* 12-page booklet pictures and describes facilities for deep-drawing, spinning, hydroforming, stamping, punching, spot welding, tool making.

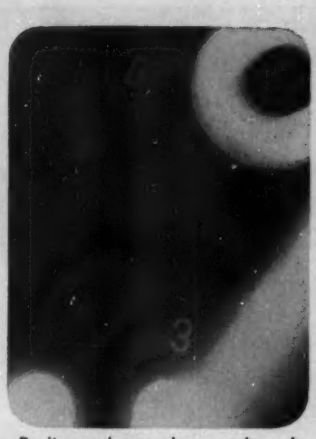
30 APPRENTICESHIP PROGRAM—*Publications Branch, Bureau of Apprenticeship, US Dept of Labor, Washington 25, DC.* 32-page booklet outlines various steps in setting up and placing in operation a program suited to individual company needs.

Reader Service Department
American Machinist
330 W. 42nd St.
New York 36, N. Y.

Place 3¢ Stamp Here

Reader Service Department
American Machinist
330 W. 42nd St.
New York 36, N. Y.

Place 3¢ Stamp Here



Radiograph reveals several sand inclusions. These must be chipped out and repaired.

Later radiograph shows repairs have made the casting sound—saved the cost of re-casting.

RADIOGRAPHY

teams with Foundry know-how

to produce a sound high pressure valve body

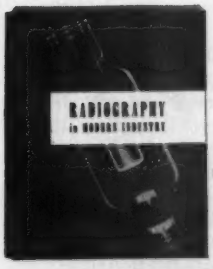
TO TAKE its place in a 300 psi system, this steel valve casting had to be sound. So, it was checked by radiography, revealing the presence of sand inclusions. These were chipped out and the necessary repairs made—a second radiograph showed a sound, homogeneous casting.

This is another good example of the way radiography is used to insure good work, avoid waste, and prevent service failures. It's another example of the way it can improve operations and increase business.

Perhaps you, too, can do this through the use of radiography. Talk to your x-ray dealer. Send for a free copy of "Radiography as a Foundry Tool."

RADIOGRAPHY

another important example of photography at work



RADIOGRAPHY IN MODERN INDUSTRY

A wealth of invaluable data on radiographic principles, practice, and technics. Profusely illustrated with photographs, colorful drawings, diagrams, and charts. Get a copy from your local x-ray dealer—price, $3.

EASTMAN KODAK COMPANY
X-Ray Division
Rochester 4, N.Y.

Kodak

Heavy-Plate Shear

Steelweld shear, Model 24G-8, is designed for production shearing of steel plate in sizes up to 8 ft long by 1½ in. thick.

End housings are provided with heavy, deep-throat forgings that add to frame strength and increase cutting possibilities, especially for certain angle cuts and slitting. Operates on pivoted-blade principle: blade travels in a circular path without use of guides and slides common with guillotine models, eliminating a source of wear and inaccuracies. Electric foot switch is used for operation. Operating speed is 22 spm; adjustments are provided to permit slitting and notching.

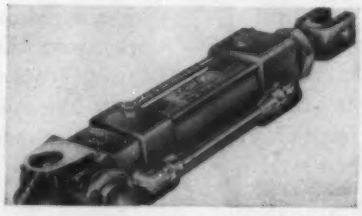
Cleveland Crane & Engineering Co, Wickliffe, Ohio

Portable Hardness Testing Kit

Checks metals, plastics, ceramics, and quartz surfaces; weighs less than 15 lb.

Includes two 7-oz instruments, one for testing steel in the hard range, incorporating both R and Brinell 3000 kg. Nonferrous instrument has R and 500 kg Brinell scales. All hardness values are read directly. Lightweight anvil is used for supporting small specimens and laboratory test blocks for exact calibration. Instruments check parts of all sizes.

Peabody Industrial Co, 2832 E Grand Blvd, Detroit 11



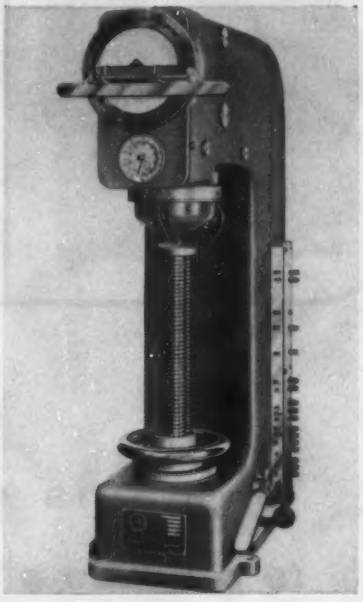
Air Motor Has Sealed-In Lubrication

Air motors are available in bores of 1½, 2, or 3 in. with any desired stroke. Built-in valve can be operated manually by air or by electricity. Air operation is by means of poppet or bleeder valves which control movement of four-way slide valve. Valve can be operated electrically, utilizing any one of different types of controls for built-in solenoids: Low-voltage body-ground solenoid type; 110-v body-ground solenoid type; 110-v independently grounded solenoids.

Valve body is made of high quality bronze. Valve piston is stainless steel. Slide valve is bearing bronze sliding on steel bar stock base which assures freedom from grooving.

Motors can be furnished with or without adjustable cushions at either or both ends of cylinder. All units have adjustable speed control of piston rod in both directions. Nine different types of mountings are available. Motors are suitable for air pressure to 200 psi.

Lehigh Foundries, Inc, Air Control Div, 1500 Lehigh Drive, Easton, Pa



Reflex Machines For Hardness Testing

Reflex machines for Vickers, Knoop, Grodzinski, Brinell, and Rockwell tests, feature load capacities from 1 to 250 kg, pushbutton load selection, and automatic projection. Load selection is simple and rapid—all weight blocks remain in machine.

Optical elements were specially developed and made by Carl Zeiss. After test load has been removed, magnified image of indentation is automatically projected on ground glass screen, at magnification up to 140 times. Ground glass can be replaced by photographic plate-holder. Bulletin Micro-Reflex and Bulletin DIA-2 give further information.

Gries Industries Inc, Testing Machines Div, New Rochelle, NY

Reversible Gages

Added to the Bath line of ground thread taps and regular thread gages is a new line of thread and cylindrical reversible gages claimed by the manufacturer to cut gaging costs in half. These gages are made from selected steel and have a luster-lapped finish. They are adjustable for use as depth gages and have go and no go color identification.

John Bath & Co, Inc, 30 Grafton St, Worcester 8, Mass

What size is a quality fastener?

Here are two ELASTIC STOP® nuts.
Each has the familiar red locking collar. Each is self-locking, vibration-proof and can be reused many times. Each is a fast, readily assembled one-piece unit . . . will maintain accurate adjustment anywhere on a bolt. Each will afford positive protection against thread corrosion . . . prevent liquid seepage along bolts. Each is manufactured in quantity. Each is exactly controlled as to quality of raw material, finished dimensions, class of thread fit, seat squareness and finish. Each has a record for precision and uniformly high performance that is unmatched.

But . . . one measures 1/10 inch across the flats; the other, 4 inches. Between these two, there are more than 530 different hex nuts in the ESNA line. They are the result of variations in height, material, finish and size.

Look to ESNA for the top quality self-locking fastener that fits your need best.

ELASTIC STOP NUT CORPORATION OF AMERICA

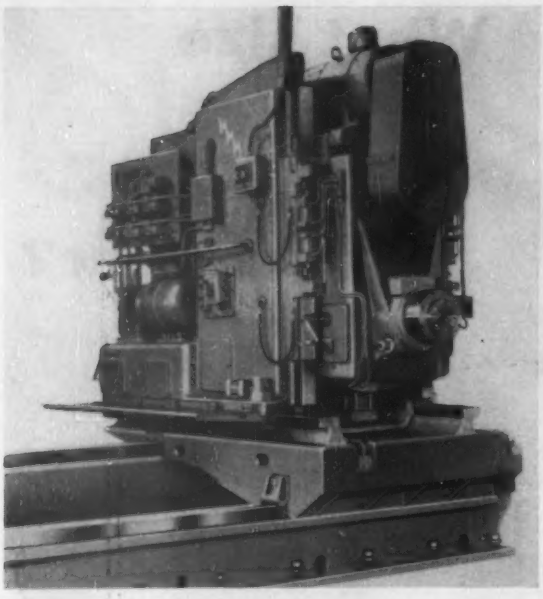
ESNA TRADE MARK

ROLLPIN TRADEMARK

Elastic Stop Nut Corporation of America
Dept. N58-119, 2330 Vauxhall Road, Union, N. J.
Please send the following free fastening information:

☐ ELASTIC STOP nut bulletin ☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name_____ Title_____
Firm_____
Street_____
City_____ Zone_____ State_____



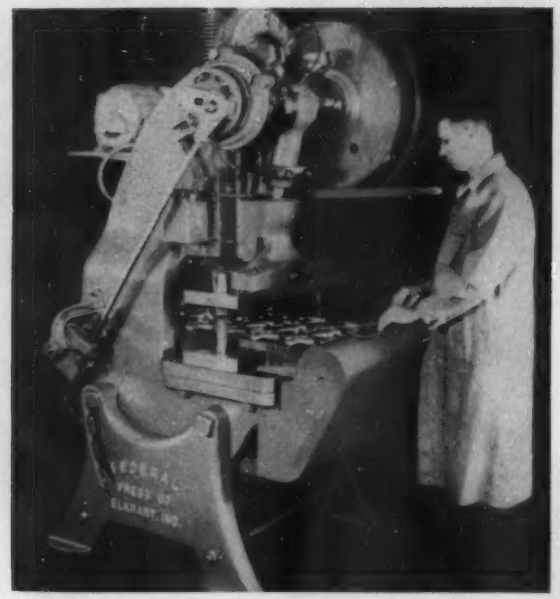
Heavy-Duty Milling Machine For Tank Manufacture

Heavy-duty floor-type milling machine is designed for use with special equipment manufacturing M-48 tank hulls. Milling head is Motch & Merryweather single-speed type with added speeds through change gears; 75 hp is introduced directly into head by multiple V-belt and bull gear. 2 in. of quill adjustment are provided for cutter wear and adjustment. Manual lock secures quill after location.

Hydraulic cylinders feed saddle at variable rate. Housing is positioned hydraulically on ways of saddle. Barrel-type multiple stop controls housing location. Milling-head feed up or down is hydraulic. All sliding way surfaces have non-metallic liners.

Each moving part of the machine has hydraulically actuated power clamping with interlock to prevent movement until the operator has unclamped that member. All contact surfaces and bearing points are pressure lubricated. The milling head is about 50% cradled between the ways, to resist twist and thrust.

Motch & Merryweather Machinery Co, Cleveland 13

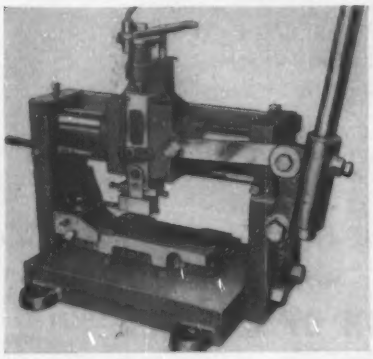


High-Speed Press Has Conveyer Feed

Unit produces up to 7200 pieces per hr, with a single operator. Standard Federal OBI Model 44, with wide ram and wide bolster plate, was utilized in design, permitting engineering of a correspondingly wide chain conveyor with 19 pairs of stations— 38 in all.

Safety stop mechanism reportedly assures perfect alignment at each work station, and functions to stop press in case of jamming or misalignment. Pressings are automatically ejected from conveyor and slide into containers at rear of press.

Federal Press Co, Elkhart, Ind



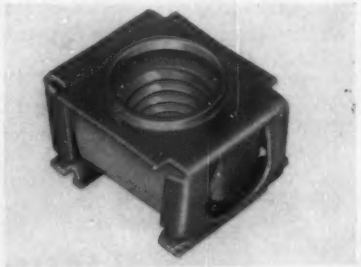
MARKING MACHINE is inexpensive bench model designed for high rate of speed. Outstanding feature is reportedly ease with which it can be set up to mark variety of flat and cylindrical pieces. Simple adjustments make it possible to insure evenness of impression. Machine is engineered for use with Prior precision steel type of either straight or roll design — *Prior Steel Stamps, 16 W Jackson Blvd, Chicago 6*

Electronic Indicating Controller For Various Process Applications

The 400 Series Capacitrol, available in many control forms, is a self-contained direct-deflection indicating controller. A few applications include heat-treating furnaces, ovens, kilns, machinery for extruding and molding plastics and nonferrous metals. It can also be used for such applications as indicating and controlling voltages, current, speed, and similar variables.

A two-compartment aluminum case, designed for surface or flush mounting, houses components. Upper section contains plug-in measuring system, the lower a plug-in control chassis. Both black molded plastic cover sections are fully gasketed for protection against dust and moisture. Full-view controller window is contoured to eliminate reflection and glare.

Wheelco Instruments, Div Barber-Colman Co, Rockford, Ill

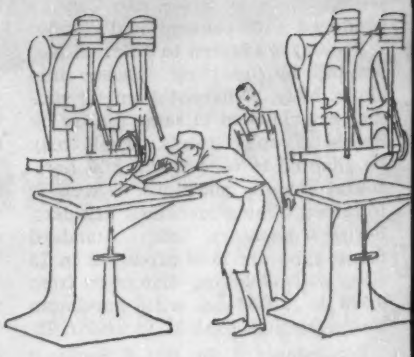


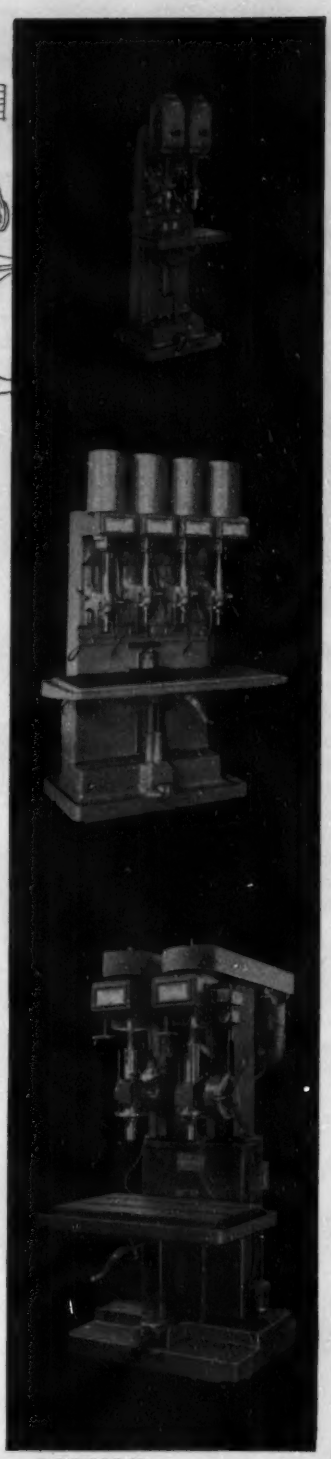
Self-Anchoring Fastener

T-shaped nut, called Self-Anchoring Speed Grip, is made of high-grade steel and preassembled into a spring steel retaining cage.

After slipping into a panel hole and anchor-locking in position, it is said to be impossible to rotate the nut, or drive it out of its spring steel enclosure.

Tinnerman Products, Cleveland 13





NOW'S the time to plan for PROFIT...

with NEW Leland-Gifford Drilling Machines

Right now many of us have a breathing spell in the hurly-burly of production bottlenecks and backlogs. It's a great opportunity to get set for the stiff competition coming up — to beat the squeeze on profits already being felt.

Take a good look at the drilling machines which have been fighting your production battles for years. Then compare them with the new Leland-Gifford drilling machines.

With convenient central controls, fast speed changes, reduced work handling and many other advanced features, these modern drilling machines can boost production and accuracy to the point where profits are considerably widened and competition is not only met but bettered.

Your inquiries and orders will receive immediate, complete and personal attention. Deliveries can be made *promptly*.

Get in touch with the office nearest you or write for complete information.

LELAND-GIFFORD
Drilling Machines
WORCESTER 1, MASSACHUSETTS, U.S.A.

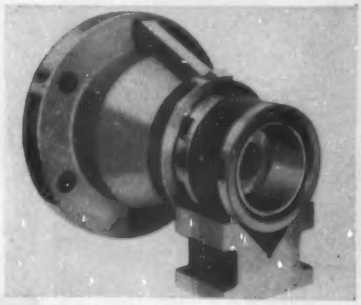
- **CHICAGO 45**
  2515 West Peterson Ave.
- **DETROIT**
  10429 West McNichols Rd.
- **CLEVELAND 21**
  P. O. Box 217
- **NEW YORK OFFICE**
  75 South Orange Ave.
  South Orange, N. J.
- **LOS ANGELES OFFICE**
  2620 Leonis Blvd., Vernon 58, Cal.
- **INDIANAPOLIS 6**
  P. O. Box 1051
- **ROCHESTER 18**
  P. O. Box 67, Roselawn Station

Niagara Press Line Has Enclosed Construction

Driving mechanism of straight side double crank Series SC-2 is completely concealed. There is no overhanging flywheel, clutch, brake, intermediate shaft, motor, in rear of press to obstruct crane service, block light, throw grease, and consume unnecessary floor space.

Rigidly constructed one-piece and four-piece frames, with triple box section design, are said to provide maximum resistance to deflection from horizontal, diagonal, and torsional stresses. Capacities range from 50 to 300 tons. Detailed information in Bulletin 64-H.

Niagara Machine & Tool Works, 683 Northland Ave, Buffalo 11

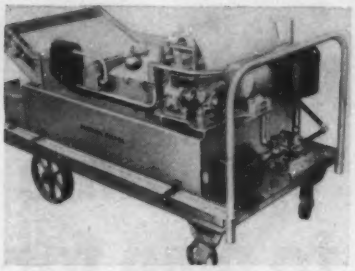


Chucking Fixture

Hobbing fixture is reported to increase production and accuracy by providing faster method of chucking tractor drive pinions accurately. Design utilizes elasticity of metals to compress solid inner shell evenly around ground hub of pinion. Unit is said to eliminate runouts; pitch-line concentricity of cut gear is reported more accurate and can be produced with conventional chucks.

Fixture is adapted to different hub lengths by inserting spacers into chuck body. Different diameter pinions are chucked in same fixture by means of split collets. Tools may be adapted to all vertical and horizontal hobbing machines, as well as to lathes, honing machines, grinders, boring machines, etc. Standard flange-type are now produced in 13 sizes with chucking diameters from 0.500 to 4.0000 in. with maximum torque ratings from 37 to 2460 ft-lb.

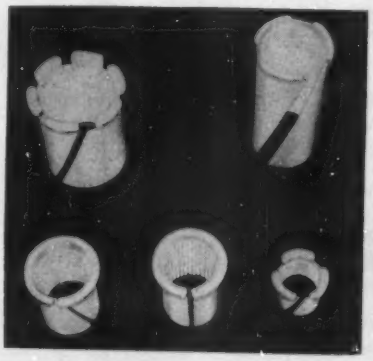
Scully-Jones & Co, 1901 S Rockwell St, Chicago



Portable Filtration Unit

Portable filtration unit incorporates Delpark disposable belt-type filter. Mounted on casters it is easily transported for periodic filtration of various liquids and oils, such as quenching oils, cutting oils, coolants, hydraulic oils, and test stand oils.

Industrial Filtration Co, Dept P-287, Lebanon, Ind

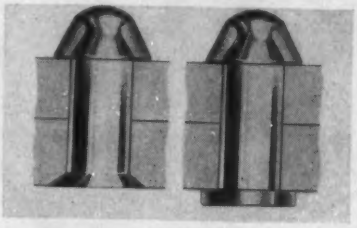


Flanged-Type Nylon Bearing

Bearings are used primarily to eliminate lubrication and to increase bearing life. They incorporate the compensation gap principle which permits circumferential expansion and contraction of the nylon material without appreciably affecting the bore diameter. Flange has two purposes. One is to permit bearing to carry end thrust against shoulder in addition to radial load. The other is to afford simple means of axial retention of bearing in at least one, and in some cases, both directions. For relatively heavy thrust loads a continuous flange can be provided which is interrupted only at the compensation gap.

Either type of flanged Nyliner can be provided with an anti-rotation boss or lug under the flange which engages a notch or slot in the bearing housing. Special production equipment has been developed which, by using adapters, permits the production of various sized Nyliners to the customer's specifications for a moderate tool charge, according to the manufacturer.

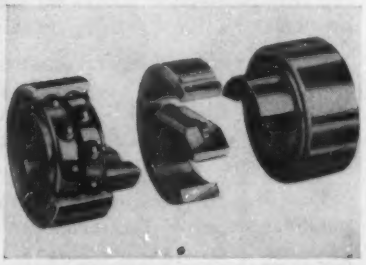
Thomson Industries, Inc, Engineering Dept, Manhasset, NY



Hi-Shear Rivets in Titanium

Pheoll Hi-Shear rivets manufactured from C-130AM titanium alloy reportedly offer a 40% weight-saving over alloy steel products. Said to have a minimum shear strength of 95,000 psi, and can replace high-heat-treat alloy steel Hi-Shears without decreasing structural strength. No protective finish or lubrication is necessary, and excellent corrosion resistance is said to be one of the properties.

Pheoll Manufacturing Co, 5720 W Roosevelt Rd, Chicago 50



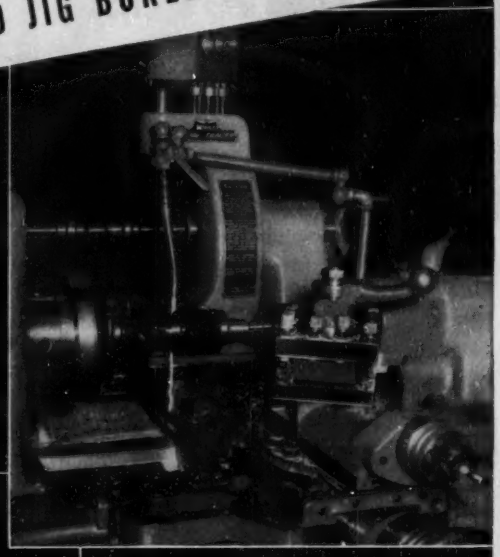
NOBAK transmits torque in both clockwise and counter-clockwise rotation and it can be used to lock driven mechanism in any angular position. It can be used in all types of vehicles in hoists and conveyors, and actuator mechanisms, and all other equipment requiring positive angular positioning and protection against reverse torque. *—Ahlberg Bearing Co. 3025 W 47th St, Chicago*

SIDNEY

FLUID TRACER AT WORK

in the plant of

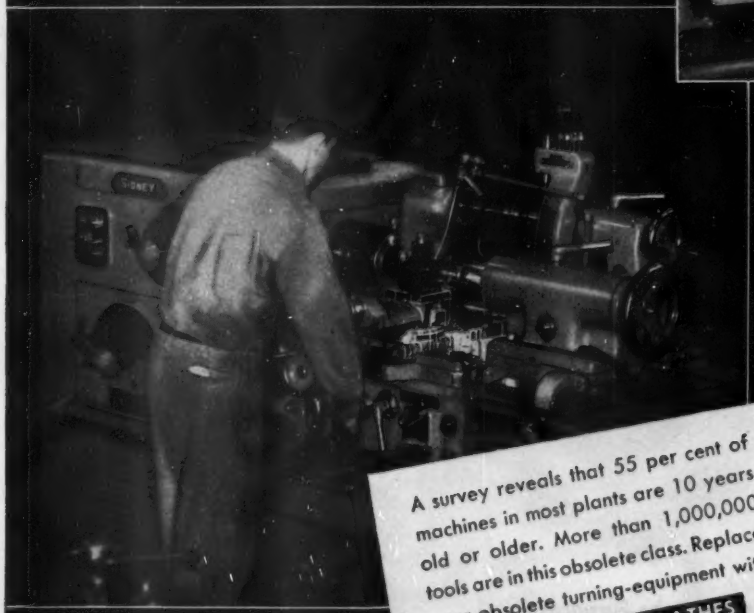
THE FOSDICK MACHINE TOOL CO.
CINCINNATI
MANUFACTURERS OF
RADIAL-SENSITIVE-UPRIGHT DRILLS
AND JIG BORERS



Here's what Fosdick thinks about Sidney Lathes:

"This Sidney Lathe with tracer attachment has been very satisfactory, resulting in considerably reduced production time and, at the same time, holding closer tolerances."

Note how simply and economically the SIDNEY FLUID TRACER reproduces any type of work in any quantities desired . . .



THE TRACER HEAD FOLLOWS ALONG A TEMPLATE OR MASTERPIECE AND THE WORK IS DONE WITH ACCURACY OF UTMOST FIDELITY . . . QUICKLY.

A survey reveals that 55 per cent of machines in most plants are 10 years old or older. More than 1,000,000 tools are in this obsolete class. Replace your obsolete turning-equipment with

MODERN SIDNEY LATHES

THE SIDNEY MACHINE TOOL COMPANY · 50th Year · of service to AMERICAN INDUSTRY · 1904 · 1954 · SIDNEY · OHIO

WRITE FOR BULLETINS

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904

Combination Honing And Coolant Unit

Pedestal model combination honing machine and coolant unit features spindle speeds which, without the necessity of changing belts, are variable from 400 to 1000 rpm. Designated as Model JCP, the machine has a honing range from 0.185 to 2.500 in. No adapters are required. All mandrels fit to the spindle with bayonet lock. Mandrels or stones may be changed without tools. All stones are ground to size.

Machine permits honing over keyways, spline gears, and most broken surfaces. A counter-balanced pedal, extending from the bottom of the base, is adjustable to any desired pressure.

The coolant unit has a newly designed expandable splash tray which, for long work, affords an additional 10-in. extension on the pan and keeps oil splash and mist off the floor. Hose can be flexed to aim exactly at any point, and nozzle is adjustable to any flow of oil. Unit is quickly disassembled for cleaning.

The JCP is 60 and 3/16 in. high, 33 and 3/16 in. wide, 31 in. deep with the extension pan closed and 41 in. deep with the extension pan open.

Superior Hone Corp, 1607 Elreno St, Elkhart, Indiana

Dial Indicator Has 2-in. Range

Dial indicator which measures 2 in. in increments of 0.001 in., is designated D8IT. AGT specifications have been followed throughout except for length of stem, dust cap, and rack. Indicator has two revolution counters.

The first counter counts revolutions of large hand while second counter indicates how many times the first revolution has been around. Pullback spring of long-range indicator is completely enclosed in case.

Features include dynamically balanced indicating hand; no-glare bezel and case; and specially designed gears for accuracy. Full-jeweled movement reduces friction to minimum.

Regular Federal back with vertical central holding bracket is furnished, as is regular contact point.

Federal Products Corp, 1144 Eddy St, Providence 1, RI

Line of Air-Control Valves Complies With All JIC Standards

Air-conrtol, in-line-design valve is said to be first of its kind to provide a fully enclosed solenoid; first pilot-operated valve to function efficiently down to 5 psi; its exhaust can be throttled for speed control.

Line consists of 47 models with pipe sizes ranging from ¼ to 1 in., comprising both 2-way and 3-way actions, solenoid and remote pilot actuation, line-mounted and foot-mounted. Operates on low pressures.

Numatics, Milford, Mich

Electric Tube Furnaces Produce High Temperature

Electric tube furnace available for one, two, and four tubes, is recommended for high temperature combustion in determinations of carbons or sulfurs in ferrous and nonferrous materials.

H model units provide large air space between inner and outer housings, and brief heating-up time is achieved through combination of extra-large silicon carbide elements, ample transformer size, and heavy insulation. Continuous operation up to 2650 F is the recommended level.

Construction is of heavy gage steel; all electrical connections are enclosed. Three sizes are available for one, two, or four tubes up to 1½-in. OD. All H models have standard 9-in. heating chamber.

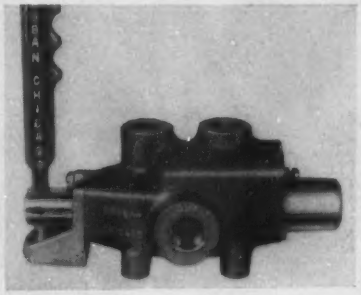
Burrell Corp, 2223 Fifth Ave, Pittsburgh 19

Comparator Checks Spacing On Various Machine Parts

Portable spacing comparator can be operated by skilled and unskilled workers. Checks spacing on flat and circular thread-rolling dies, thread chasers, circular and flat form tools, etc, to within 0.0001 in. Range is 1/16 to 5½ in.

Each unit is complete in itself. It consists of two work-contact points having horizontal travel. Measurement results made by these contact points are transferred to dial built into top of comparator. Complete variety of points are available.

Jerpbak-Bayless Co, Solon Road, Solon, Ohio

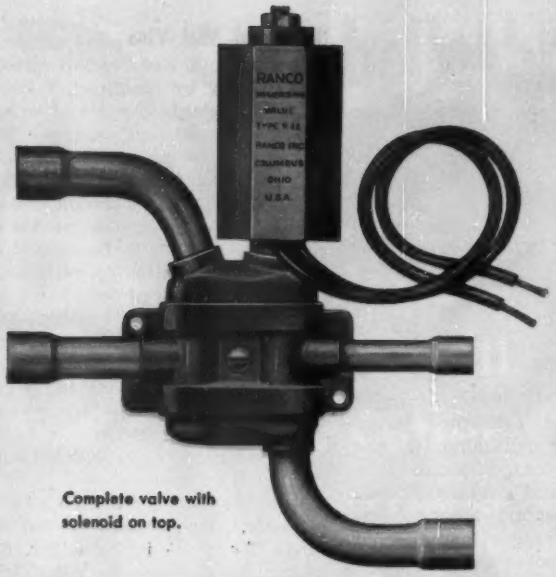


Hydraulic Control Valve

Model 126 incorporates: adjustable pressure relief valve, control lever mountable in any of four positions, longer mounting feet for easier valve mounting on flat surfaces. The finer grip control handle is drilled for remote control rod. Working pressures are up to 1500 psi. The chrome-plated spool is hardened and ground. Valve is self-centering and fully balanced. Open center provides pump bypass with spring return to neutral.

Four-way control unit was designed to actuate one double-acting hydraulic cylinder, or two acting as one. It is a pressure-balanced sliding-spool hydraulic valve, ideally suited for operating hydraulic loaders, dumps, push-offs, etc.

Groban Supply Co, 1139 S Wabash Ave, Chicago 5



Complete valve with solenoid on top.

REVERE

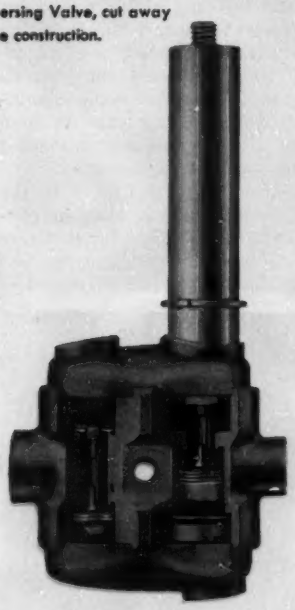
collaboration helped make this reversing valve possible

The valve shown here is unique. It is made by Ranco, Incorporated, Columbus, Ohio, and is being supplied to manufacturers of air conditioners that either cool or heat, according to the temperature. When the thermostat calls for cooling, a solenoid moves the valve to the cool position; when heat is required, the operation is reversed, automatically.

Naturally, the development of this valve took a long time. For some five years the Revere Technical Advisory Service has been collaborating closely with Ranco engineers on design and materials for control valves of various types. When the new idea was under development, Revere was called in because non-magnetic brass and copper would be required for the body. Designs were mutually studied, and it was decided to make the main portion of the body from a brass forging, which would lessen machining and provide a dense, non-porous, non-leaking part. Many thousands of these reversing valves have been shipped to makers of ½, ¾ and 1-horsepower units, without a single forging rejection. One important feature of the forging is that it makes possible silver brazing the inlet and outlet tubes so quickly that no damage is done to the synthetic valve washers. Ranco feels that the valve has a tremendous future, offering as it does completely automatic selection of heating or cooling.

When you have a new project on your boards, involving aluminum, brass or copper, we suggest you get in touch with the Revere Technical Advisory Service. Its knowledge added to yours may make your products better. See the nearest Revere Sales Office.

Ranco Reversing Valve, cut away to show the construction.



Revere Brass Forging is supplied to Ranco already machined.

REVERE

COPPER AND BRASS INCORPORATED

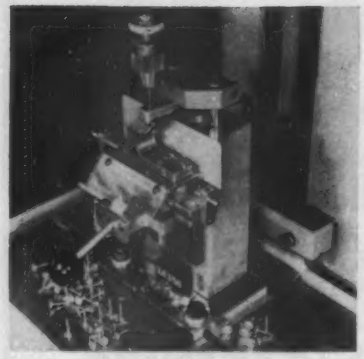
Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

• • •

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.

SEE "MEET THE PRESS" ON NBC TELEVISION, SUNDAYS

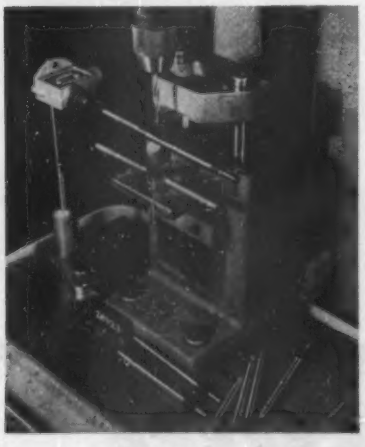


Vertical Clamping Units Are Air-Operated

New universal clamping fixtures, two of which are illustrated, represent an addition to the Snow line of standard master fixtures.

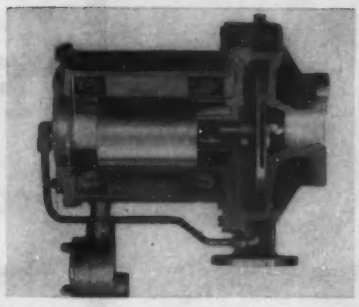
Shown above is a cross-drilling operation on a shaft end and tooling consists of one of the standard studs and bushing plates tooled inexpensively to permit the insertion of the part to contact the microswitch which nitiates the spindle cycle and synchronizes the clamping action to the fixtures. As soon as cycle is completed part is ejected by spring-loaded contactor.

Another fixture available is the simple locator button used in conjunction with a V-plate for positioning a shell case for drilling.



Fixture above illustrates sliding base adaptation for handling multiholes in parts. The work-holder varies with the type of part, but base is standardized. Proper position is obtained with stops on slidebase while clamping and drilling cycle is synchronized by lifting lever into accurate spacing notch on crossbar to contact microswitch.

Snow Mfg Co, 435 Eastern Ave, Bellwood, Ill

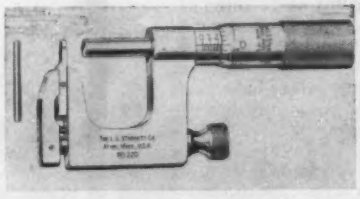


Centrifugal Pump Operates Without Seals

Totally enclosed cam-rotor pump combines motor and pump in one package, eliminates mechanical seals, stuffing boxes, and packing glands. Pumped fluid enters rotor chamber and stainless steel liner inserted in air gap of motor isolates stator section. Automatic lubrication of bearings is provided by fluid being pumped. Units handle fluids at temperatures to 450 F and pressures to 150 psi.

Sizes range from ⅛ to 3 hp, giving capacities to 180 gpm and heads to 90 ft. Special models are available to handle greater extremes.

Chempump Corp, Station A, 1300 East Mermaid Lane, Philadelphia 18, Pa



Micrometer Features Interchangeable Anvils

Starrett micrometer will handle wide variety of measurements because it features multiple interchangeable anvils. Two anvils are furnished—a rod anvil approximately 0.120 in. in dia and a flat anvil 0.125 in. and 0.060 in. thick at opposite ends. Rod anvil is useful for measuring from hole to edge. With flat anvil, distances from inside the slots and grooves to edge can be measured.

Micrometer features vise frame which holds interchangeable anvils. Unit has a range of 0 to 1 in. and reads in thousandths of an inch. Features include no-glare satin-chrome finish, hardened and ground spindle, micro-lapped anvil and spindle faces, and quick reading graduations.

The L S Starrett Co, Athol, Mass

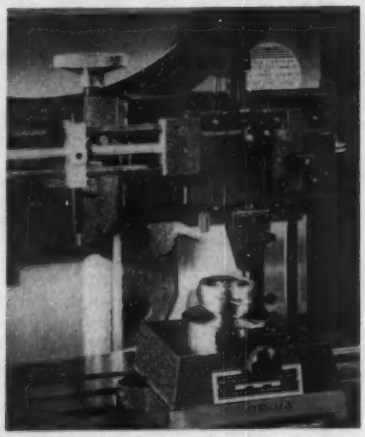
Universal Mill Vise

Universal mill vise has jaw opening limited only by length of T-slotted machine table. It consists of two independent jaws, one equipped with screw pressure unit and unique tie-bar feature. Jaws mount on machine table at any width opening and are prevented from slipping by tie bar which fits into table T-slot and engages teeth in bottom of each jaw.

Other features provided are two optional methods of holding work, either by conventionally tightening one screw jaw or by removing two steel jaw plates and installing cone poin holddown bolts which are provided. Each independent jaw is provided with two keys which fit into the T-slot of table.

Each jaw is 2½ in. high and 8⅞ in. wide. The standard tie-bar will fit all T-slots ½ in. or wider. It is 36 in. long and may be cut shorter.

Universal Vise and Tool Co, Palmer, Mich



Coordinate Tracer for Optical Projection Gaging

The OGP Coordinate Tracer, Model 24, is a standard accessory designed to increase the versatility of optical projection gaging. By tracing contours and transmitting the tracing motion to a target in the light beam of a projector, the tracer makes possible the accurate gaging of dimensions heretofore difficult, or even impossible.

Some examples include: ball nut part with critical internal radii—tracing arms enters through one end of part; pinking shear blades—many interfering angles and odd contours; headlight lenses—either concave or convex surfaces staged on three-point contacts; screw machine parts—even with intricate internal blind contours. Illustrated is coordinate tracer gaging dimensions of a ball joint bearing.

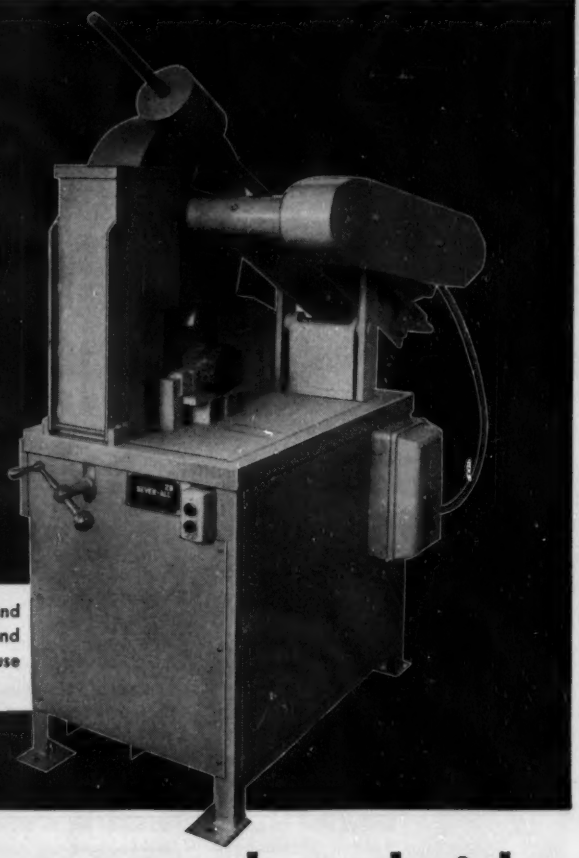
Optical Gaging Products, Inc, 86 Forbes St, Rochester 11, NY

Campbell Abrasive Cutter

ACCO product

New Model 28 Campbell Sever-All Dry Cutter

- Compact
- Portable
- Ideal for contract or construction work



CAPACITY: Solids up to 4" x 4" square, angles and channels to 8", tubes and pipes to 4" O.D., 4" angles and channels and 4" O.D. pipe at 45° angles. Based on use of 18" cutting wheel and 10 H.P. motor.

Here's a versatile cutter you can take to the job

• This new CAMPBELL Model 28 SEVER-ALL Abrasive Cutter is a dry-cutting machine which combines the capacity for a wide variety of cutting operations with a compactness which permits a portability seldom found in cutters of its type and capacity. It is ideal for cutting all types of material in contract or construction work. Can be supplied with work stop and with wheels for easy movement from job to job.

From front to back, the SEVER-ALL measures but 56". It is only 32" wide and 62" in height. Other important features include:

1. Work clamped on both sides of cut by hand-operated, self-centering work holders. Can be supplied with foot-operated treadle.

2. Time of cut is approximately 3 seconds per square inch of material.

3. Operator safety provided by complete enclosure of cutting wheel during operation—except for openings to clear the work.

4. Lowering of guard permits accurate location of work, permits long pieces to be placed in machine without threading through.

This Model 28 SEVER-ALL cutter is the newest of a long line of CAMPBELL Abrasive Cutters which provide many exclusive features. CAMPBELL field engineers are conveniently located to consult with you on ALL your cutting problems. Write today for specifications on the SEVER-ALL or **Bulletin DH-301** on the CAMPBELL Abrasive Cutting Method.

ACCO TRADE MARK

Campbell Machine Division
AMERICAN CHAIN & CABLE

923 Connecticut Avenue, Bridgeport 2, Connecticut

Mechanical Drilling Machine Incorporates 529 Spindles

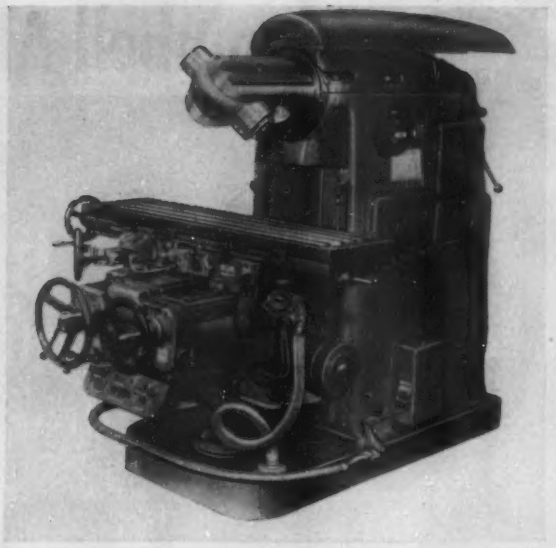
High-speed drilling machine of which all movements are mechanical in contrast to the conventional hydraulic system used on all Zagar drilling machines, incorporates 529 spindles.

The diameter of the holes drilled by this machine is 3/16 in. Drillhead is of gearless design permitting centers as close as ¼ in. The 529-spindle drillhead is directly driven with a 30-hp motor. The ram is actuated by mechanical motion similar to that of a shaper.

Material to be drilled is loaded manually into a hopper. It is mechanically positioned under the drillhead for the drilling cycle. Removal of the drilled part can be done by the next piece as it is fed mechanically to drilling position.

Length of stroke, depth of drill, and rate of speed can be adjusted to hole-finish requirements.

Zagar Tool, Inc, 24000 Lakeland Blvd, Cleveland 23

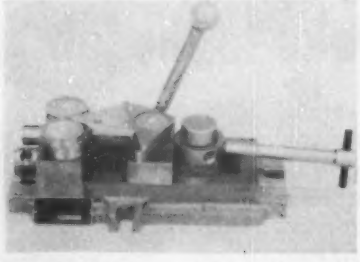


Milling Machine Head Set in Three Planes

Gambin F27 milling machine incorporates a head which may be set in three planes. Not only does it swivel and tilt, but entire spindle assembly and arm slides, thus permitting milling cutters to be positioned at any angle as well as at variable distances from frame.

Rigidity is afforded by fact that head is integral part of machine and 8 hp of spindle motor is delivered to cutters. Other features include optical gages graduated to 0.005 in.; 40 speeds—22 to 2000 rpm, 36 feeds —½ to 28 ipm; as well as controls accessible from all sides of machine.

Imported by Permasco, Div Winter, Wolff & Co, Inc, 76 Beaver St, New York 5

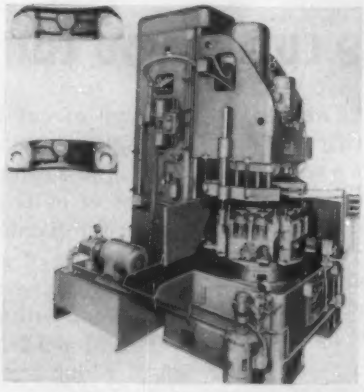


Speed Vise

Model B Prestoflex Varijaw speed vise is designed primarily to hold irregularly shaped objects. Incorporating self-contouring floating jaws, tool can be used as variable jig or fixture setup, a speed vise or assembly clamp. Quick-acting screwless locking mechanism can be set for adjustable locking pressures.

Features include: individual locking cams for each series of self-contouring jaw plates; individual replacement of jaw plates easily feasible; jaw retainer pins pre-drilled and tapped with 5/16x18 thread; and all jaw plates of high grade Timken tool steel.

The Custanite Corp, Larchmont, NY



AUTOMOTIVE PARTS are turned out on this five-station automatic indexing machine which loads four parts per station and has production capacity of 670 per hour. Combination drilling and tapping head features independent lead-nut plate. Hydraulic and electrical installations conform to JIC standards. Other features include fully automatic hydraulic clamping; hardened and ground laminated tool steel ways. Automatic index is electrically controlled — *Buhr Machine Tool Co, Ann Arbor, Mich*

Battery Has Built-In Charger

Battery unit, for "walkie" design powered lift trucks, is equipped with a permanently mounted charger.

Battery remains on the truck and can be given a boost whenever vehicle is not in operation. Can be charged by plugging into any 110-v, 60-c outlet. Charger can be left on without damage and routine charging done overnight, with no loss in truck use or need for substitute battery. Disconnection of battery from truck is unnecessary, since charger is permanently connected to the terminals. Top tilts back for easy access for adding water.

This power unit is identified as the KW type "Charger 6 SPC-11" 275 amp-hr.

K-W Battery Co, 2670 W Howard St, Skokie, Ill

A New TWIST in Carbide

WENDT-SONIS Shear-carb HELICAL MILLS in CARBIDE

SMOOTHER FINISH

Because the helical tooth maintains a constant cutting relation between the work piece and cutting edge. The chip formation is uniform at all times.

2 TO 3 TIMES LONGER TOOL LIFE

Because tool shock is greatly reduced when Shear-Carb teeth engage the work.

25% LESS HORSEPOWER

Because of the shear cutting action of each helical tooth. In actual tests Wendt-Sonis Shear-Carb mills required approximately 25% less power.

COMPLETE LINE

You can get Wendt-Sonis Shear-Carb end mills with straight or tapered shanks from ½" to 2" in diameter and shell mills from 1¼" to 6" in diameter . . . in styles and carbide grades to machine any material.

Mail Coupon Today!

WENDT-SONIS

HANNIBAL, MISSOURI

WENDT-SONIS COMPANY
Dept. AM-1154
Hannibal, Missouri

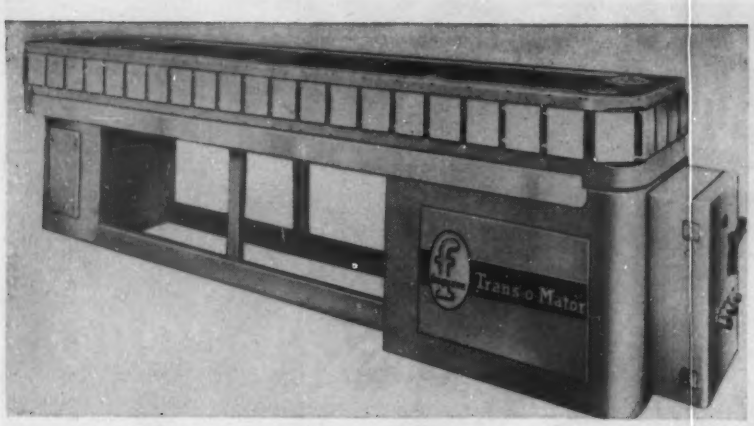
Please send me literature on new Shear-Carb end mills and shell mills.

NAME _____

FIRM _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____



Multiple-Station Transfer Machine Has Various Applications

Trans-O-Mator, standard multiple-station transfer machine, merely requires the attaching of tooling as required to perform various light machining, forming, pressing, assembling, and inspection operations.

It contains a complete power transmission unit, including motor, reducer, clutch, Ferguson Roller Gear Drive, chain, and carriers. An electrical interlock system between indexing and the tooling power supply is provided as well as start-stop and jog controls.

Type A is designed for automotive and aircraft industries. Production rates are up to 6000 pphr. Type B with speeds to 20,000 pphr is designed for operations in electrical and packaging industries.

Ferguson Machine and Tool Co, Roller Gear Div, Box 191, St Louis 21, Mo

Pneumatic-Hydraulic Power Unit For Press and Machine Closure

Prime mover combines faster action, dampened terminal stopping, more powerful finish pressures, and full reversibility in a three-cylinder assembly—states the manufacturer. The Hydro-Air power unit achieves long stroke and fast operation through pneumatic-cylinder action, and powerful closing force through the differential hydraulic - piston principle. Stroke is 7 in., terminal force either 2100 or 5600 pounds. Space requirements are less than 1 cu ft and air requirement per cycle is less than 0.11 cu ft.

The unit consists of three cylinders: one for the fast, long pneumatic stroke, the second providing the 12-to-1 hydraulic multiplication of trapped oil pressure for the finishing stroke, and a third which is the booster cylinder to trigger the finish stroke. There is provision in the second cylinder for: minimum drag during the fast forward pneumatic stroke; linear deceleration just before the high-pressure hydraulic stroke; elimination of cavitation on the return stroke; checking of speed at the close of the cycle; and independence from changes in oil viscosity due to temperature.

Pantex Manufacturing Corp, 521 Roosevelt Ave, Pawtucket, RI

Variable Speed Drive Offers Wide Range and High Capacity

Countershaft-design speed drive varies speed by changing its location between two fixed sheaves. Spring-loaded belt face maintains correct belt tension in all speed positions. Is said to assure full load-carrying capacity throughout speed range of 9 to 1. Standard V-belts are used in both the 4-in. ¾-hp, and the 6-in. 1½-hp standard sizes.

Hand control in this compound drive is located at a distance from the belts and other moving parts for greater safety; it adjusts speed by swinging the countershaft in an arc around its base. It also moves the sheave positively along its axis to maintain belt alignment in both horizontal and vertical shaft applications.

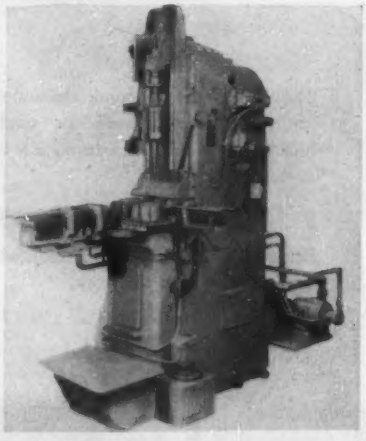
Complete data in Bulletin No. 46.

Speed Selector Inc, 118-U Noble Court, Cleveland 13

Small Spring Tester

Testing small compression and extension springs for loads and deflections can be done with accuracy on this precision instrument, according to the manufacturer. Capacity is 1/64 oz to 12½ lb with spring lengths from ⅛ to 12 in. Lengths can be read directly by Vernier scale and pointer to 0.005 in. without dial indicator. Accuracy is guaranteed within ¼ of 1%.

The Carlson Co, 277 Broadway, New York 7, NY



LAMINATED STATORS for electrical motors have their ID's broached on this automatic vertical hydaulic 3-way machine designed to fit into conveyor line. Parts coming in are shuttled into broaching position by hydraulic cylinder. Retriever lowers broach shank or arbor until it connects with automatic pull-down head. With broach in down position second hydraulic cylinder ejects part. Tooling includes various sized broach shells for broaching similar stator parts. Production rate is over 200 parts per hour — *American Broach & Machine Co, Div Sundstrand Machine Tool Co, Ann Arbor, Mich*

...call ILLINOIS GEAR

Want *real action* on your gear orders? You'll get it when you deal with Illinois Gear . . *action* that guarantees you highest quality and precision . . *action* that assures you on-time delivery . . *action* that offers you around-the-clock production for your gear emergency.

Illinois Gear, the World's largest, most modern, best equipped gear manufacturing plants, offers you the coordinated, synchronized action that makes a champion. It results from broad experience, second-to-none facilities and above all the will to produce!

For action on your gear orders, send them to Illinois Gear.

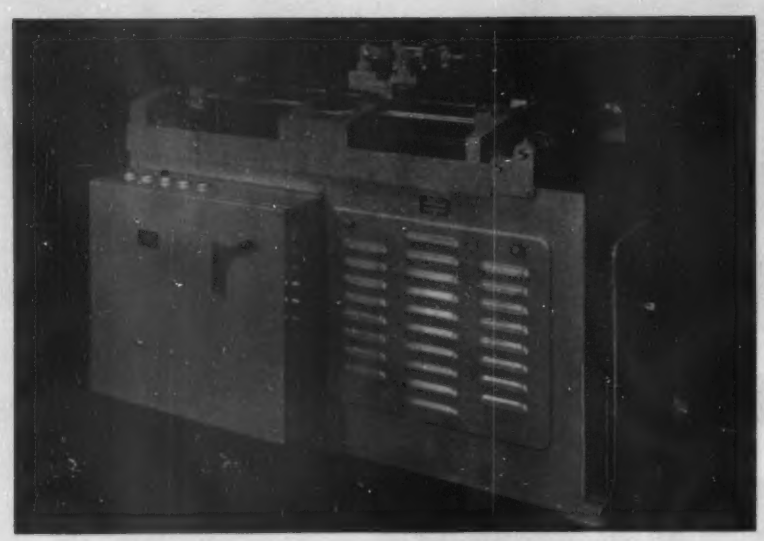
ILLINOIS GEARS

Reg. U.S. Pat. Off.

Gears for Every Purpose ... one gear or 10,000 or more

ILLINOIS GEAR & MACHINE COMPANY

2108 NORTH NATCHEZ AVENUE • CHICAGO 35, ILLINOIS



Cabinet-Mounted Slide Feed Has Independent Motor Drive

Model SFC-24-24 has capacity for material to 24 in. in width and feeding length adjustable to maximum of 24 in. at one stroke. Feed lengths over 24 in. can be obtained by means of counting unit, furnished as part of equipment. There are no mechanical connections to the press.

Additional features include: electrically controlled air-operated gripper mounted in feed block; electrically controlled air-operated check; inching control for inching material into dies; manually-operated pushbutton for single tripping press; automatic arrangement for single stroke operation; counter for cycle feeding; stock guides; and 3-hp motor with electric clutch and brakes.

US Tool Co, Inc, Ampere, East Orange, NJ

Knocked-Down Steel Trucks

Line of round-cornered units has smooth rolled top; 18-gage cold rolled steel construction; angle base frame; channel caster supports; 5-in. roller bearing steel casters.

Additional features include: ease of assembly; ease of handling in narrow aisles and confined quarters; aluminum or stainless construction available on special order; five-year guarantee.

Five standard sizes are available: 36x22x24 in.; 40x24x24 in.; 42x30x28 in.; 48x30x28 in.; and 56x22x28 in.

Kennett Equipment & Machinery Co, Kennett Square, Pa

Boron Carbide Indicator Points

The Robt Marks Co is manufacturing long-wearing dial indicator points out of boron carbide—hardest man-made material. Points insure gaging stability—should prove indispensable for production gaging. Points meet AGD dimensions. Highly polished or lapped contact faces are available in the following types: spherical, conical, and flat contact. Price: $4.50.

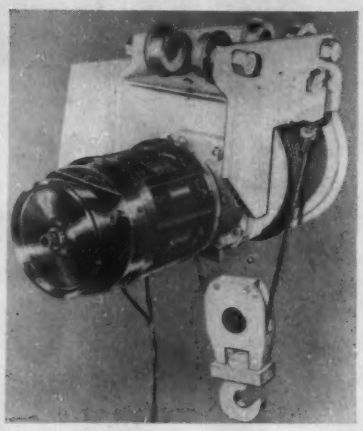
Tooling Associates, Box 945, Providence 1, RI

Infrared Lamp Incorporates Multi-Purpose Uses

General Electric has developed an infrared lamp for heating, drying, and baking that incorporates these features:

Compact tubular shape, slightly larger in diameter than a cigarette; tube is made of fused translucent quartz; produces more than four times the energy concentration delivered by 250-w infrared bulb, withstands high temp, and shock of violent temp changes; produces in higher energy concentrations in a small space (100 w per lighted inch of tube length) than has been possible in the past; gives full radiation almost instantly, eliminating a warm-up period; produces visible light as well as infrared radiation.

General Electric, Nela Park, Cleveland 12



New Hoist Line By LeTourneau

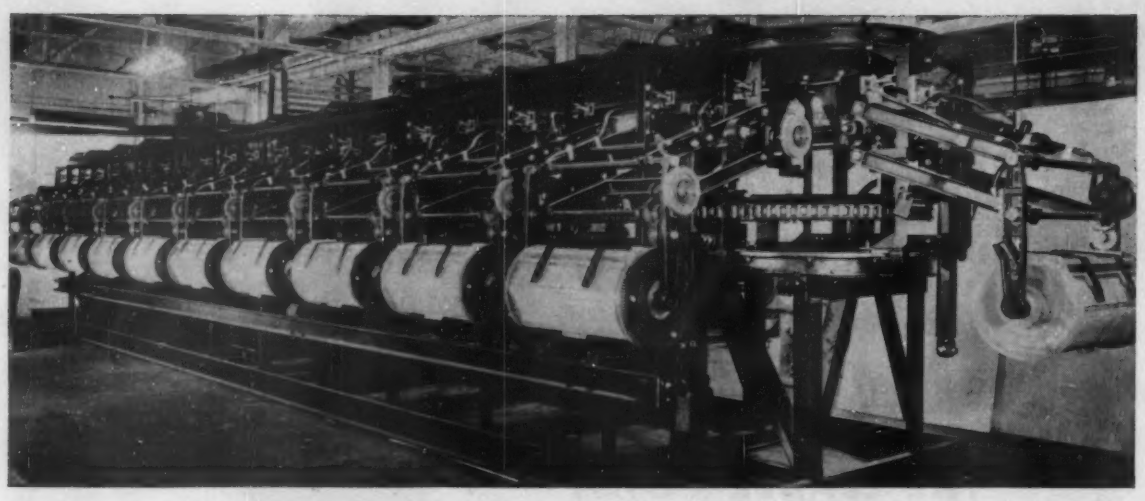
Electric hoist for overhead materials handling is a new product line of LeTourneau. The device has capacities ranging up from 4 tons with special attention given to applications requiring lifts of over 15 tons. The line will feature AC electric motors and gear reduction units developed by the manufacturer for use on their heavy electrically-powered and controlled equipment. Standard models of 4, 5, and 6-ton capacities are now being offered with wire-rope lifts and swivel hooks suspended on two-part line. Hoists are of all-steel welded construction with electrical components protected.

Positive load control down to increments of a fraction of an inch is incorporated and extra-sensitive load handling is made possible by combination of instantly-applied maximum motor torque and high-capacity bi-metallic friction brake synchronized with the pushbutton hoist controls. Positive action limit switches are available as optional equipment.

Hoist motors operate from power source of 220/440 volt, 3-phase current. Motors are single-speed, reversible squirrel-cage induction with rotor circuits completed outside stator windings. Hoist motors are controlled by operator with two-button control box suspended directly beneath hoist.

R J LeTourneau, Inc, Longview, Texas

NOW
The Leader in Stainless
Socket Cap Screws
OFFERS YOU
THE LEADER POINT
Allen's unthreaded Leader Point permits easier starting, reduces the possibility of cross threading, protects threads from damage if the screw is accidentally knocked or dropped. Your Allen Distributor stocks the largest range of sizes in 18-8 stainless cap screws available anywhere ... 97 standard sizes #4 x ¼" to ⅝" x 3" with NC threads; #10 x ⅜" to ⅝" x 1½" with NF. Be sure to specify genuine Allen Leader Points.
ALLEN
MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.
STAINLESS SET SCREWS
With the improved Allenpoint, available from your distributor in 54 standard sizes #4 x ⅛" to ½" x 1" NC and #10 in lengths from 3/16" to ¾" NF.
Sold only through leading Industrial Distributors.



Automatic Plating-Barrel Conveyor

Using standard, horizontal barrel plating cylinders, a line of new automatic conveyors is available for any standard plating process. Shown here is a machine for the normal zinc plating cycle. It is equipped with 24 cylinders, 14 in. in dia by 30 in. long, inside dimensions, and will produce 3000 to 6000 pounds of plated work per hr, depending upon surface area per pound and plating thickness.

Rigidly constructed, the chassis has a maximum fiber stress of 10,000 psi. Timer controlled speed and power-operated skip transfers provide broad flexibility. Cylinder rpm can be varied to suit operation at each station and all of the cylinders can be individually lowered or raised. Cylinders offered with the machine are of Tempron or acrylic resin. In the plating tank, the cylinders revolve in a trough of anodes. As a result of the conforming anode containers solution resistance is minimized.

These machines are engineered so that the only operating mechanism over the tanks is the V-belt drive. This will not rust. As the cylinders rotate while raising or lowering, drag-out losses and solution contamination are greatly reduced. Separate chains are used for conveying and for elevating, hence the stress of the latter does not affect the conveyor. Electrical or mechanical operation permit leaving cylinders in the "up" position indefinitely, for example over hot tanks overnight or throughout a weekend.

A power hopper, with weighing scale, permits pushbutton loading. Drying is accomplished after unloading, in a drum drier or centrifuge, or with heated-air chutes.

The Udylite Corp, Detroit 11, Mich.

Locking Insert Holds Cap Screws

One-piece screw thread is reported to perform three functions: it automatically locks screw so it is vibration-proof, ending the need for lock washers, locking wires, or lock nuts; it provides a high-strength thread; and it automatically locks itself into the parent material without the use of pins, rings or other devices.

Called a "grip-end" insert it can be incorporated into an otherwise frozen design because it requires no more boss material or wall thickness than conventional tapped thread. Like its companion Heli-Coil insert the unit is made of precision-formed stainless steel wire that seats itself springlike in a hole to provide 60° threads. The grip-end insert features a constricting area in the bottom coil which grips the screw.

Insert is available in sizes 10-32 and ¼-28 in two standard lengths. Other popular sizes are being developed.

Heli-Coil Corp, Danbury, Connecticut

Sinclair Quenching Oils

Quenching oils, known as the Sinclair Quenchol 500 Series, are said to offer greatly increased cooling power to assure a higher, more uniform degree of metal hardness, as well as greater depth of hardness.

Heat dissipation of quenched metals is closely controlled to prevent cracking, pitting, distortion, or warpage of produce. Tests indicate oils produce substantial reduction of piece rejection rates, and enable utilization of lower-cost steels for critical purposes.

Sinclair Refining Co, 600 Fifth Ave, New York

Redesigned Micro Counter

Micro counter, Model MC-22 has a total capacity of 4 lb, and will count pieces as light as 0.005 ounces in ratios of 10:1, or 100:1.

Unit, which replaces earlier Model MC-2, incorporates a single beam, instead of the double beam used previously. This cuts in half the number of bearings and knife edges—from 8 to 4, and is said to materially increase sensitivity and durability. Additional design changes include a longer balance pointer; reinforced damper bar; and numbered pans, cradles, and pivots.

John Chatillon & Sons, 85-93 Cliff St, New York 38

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Cam Follower, Made of Lehigh H, Speeds Production of Axle Shafts

You're looking at an axle shaft, being turned in the plant of Brunswick Ordnance Corporation, New Brunswick, N. J. The operation is performed automatically at high speed through the ingenious use of the cam follower shown in the foreground. This flat piece of steel, ½ in. x 2 in. x 40 in., is machined on one side to the contour of the finished shaft. It moves parallel to the rough bar, making contact with a wheel, beneath the coolant pipe, which in turn actuates the carbide bit.

Engineers at the Brunswick plant needed a steel with good machinability for the cam follower. But above all, they wanted maximum resistance to wear. Which steel did they choose? Lehigh H, our special-purpose high-carbon, high-chromium tool steel.

Lehigh H, an air-hardening steel, is ideal wherever good machinability, maximum wear and minimum distortion are important. It's safe for intricate dies having sharp corners. What's more, it's a deep-hardening steel, with high compressive strength.

Your tool steel distributor has a good stock of Lehigh H. Or you can order a supply direct from our mill depot.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Tool Failures Can Be Caused by Magnetism

Magnetism of either stock or tools can cause mystifying failures of tools. This is particularly true of punch-and-die sets, blanking tools, and occasionally, forming tools. Difficulties traced to magnetism can develop in these ways:

1. Improper feeding or positioning of stock.
2. Improper ejection of parts or scrap.
3. Several multiples feeding in at one time on some operations.

Overloading of tools produced by any of these three conditions can cause tool failure. Besides, magnetized parts pick up steel "debris," which acts as an abrasive on cutting edges, resulting in rapid tool wear. Steel stock can be magnetized by lifting with magnets, or by passing near electrical machinery or power lines carrying heavy currents. Tools are often magnetized by being ground on equipment using magnetic chucks. They can also be magnetized by other accidental means.

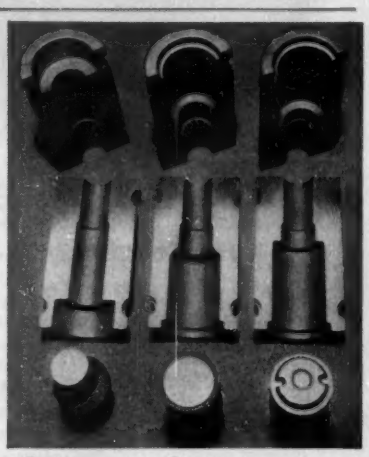
When steel parts or tools show evidence of magnetic attraction to each other, or when the edges attract steel chips or debris, steps should be taken to eliminate the magnetism. With steel stock, this can be done by tempering. But tools must be demagnetized with a demagnetizing coil, by passing them slowly in and out of the coil while it carries alternating current.

BTR HOLLOW-BAR SAVES PRODUCTION TIME

Using hardened bushings? Ring dies? Draw rings? Other ring-type applications? Then you'll find you can save time with BTR (Bethlehem Tool Room) Hollow-Bar.

BTR Hollow-Bar is made from our popular oil-hardening tool steel by a process called high-speed trepanning, in which hammer-forged round bars are cored out in the center, and are then rough turned on the outside. The operation is much like gun drilling, except that in trepanning, the cutter produces a solid bore from the bar center.

With BTR Hollow-Bar, there's no need to wait for forged rings or discs. Nor is there any drilling, rough boring, rough facing or rough turning required. You can get full particulars about BTR Hollow-Bar from your tool steel distributor.



Chrome-Moly-Tungsten Lengthens Die Life

Shown here are sets of forging insert dies and (at bottom), upset punches, used in a hot-work application. The heat-treatment consists of air-quenching and double-tempering to Rockwell C 35-41 for the inserts, and Rockwell C 45-49 for the punches. Said the user, "We like the minimum size change when heat-treating CMW. We get less heat-checking on die impressions, and better resistance to washing effect. And they add up to long die life, which is just what we want."

Distortion is Controlled in BRAD FOOTE'S DEEP CASE HARDENING

The BRAD FOOTE
DEEP* CASE HARDENING *process has been perfected to a degree which practically eliminates distortion

GEARS RUN TRUE

No place is distortion control more important than on heavy duty gears which are run almost continuously at full rating and subjected to extreme shock loads such as are encountered in rolling mill operations. BRAD FOOTE **DEEP CASE HARDENED** gears run true and distribute the load evenly across the full face and on the designed bearing surfaces of each tooth.

HARD TOOTH SURFACES

In addition, BRAD FOOTE rigidly controls to set standards the depth of **DEEP CASE HARDENING** and the carbon content. The tooth surfaces are of maximum hardness for long life, but the carbon content is gradually diminished at successive depths below the surface until it blends to the metal of the core itself.

SHOCK-RESISTANT CORES

Thus the cores of the teeth and the body of the gear remain ductile and shock-resistant while the teeth are given an increase in service life of over 50%.

ASK FOR QUOTATION

It will pay you to try a set of these gears on your toughest job. Send your specifications today for quotation.

BRAD FOOTE *makes* Spur, Bevel, Helical, Spiral Bevel, Herringbone, Zerol, Worms, Worm Gears, Reducers, Transmissions

BRAD FOOTE GEAR WORKS, INC.

1309 South Cicero Avenue • Cicero 50, Illinois
Bishop 2-1070 • OLympic 2-7700 • TWX: CIC-2856-U

subsidiaries

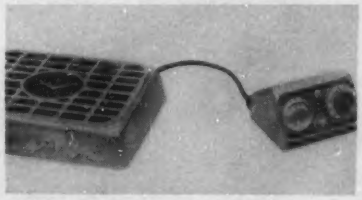
AMERICAN GEAR & MFG. CO.
Phone: Lemont 920
Lemont, Illinois

PITTSBURGH GEAR COMPANY
Phone: SPaulding 1-4600
Pittsburgh 25, Pennsylvania

Studmount Air Cylinders

Addition to the Allenair line is a 1⅛-bore air cylinder available in inches and half-inches of stroke from 1 to 6 maximum. It is double acting and features brass heads nickel plated and screwed into honed and copper-brited cylinder tube. Piston rod is stainless steel and is both screwed and brazed to brass piston. O-rings are used for sealing both and piston rod. Flange or foot mounts as well as piston rod clevis are available.

A K Allen Co, 57 Meserole Ave, Brooklyn 22, NY

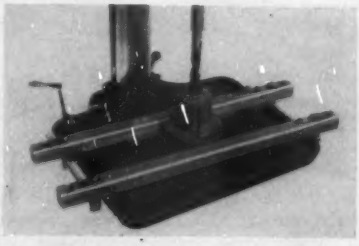


Portable Electronic Scale

Device weighs up to 40,000 lb and is no larger than a briefcase. It consists of a small platform containing electronic weight sensing element and separate file cabinet. Platform weighs 45 lb. Dial may be placed at weighing platform or installed for remote control.

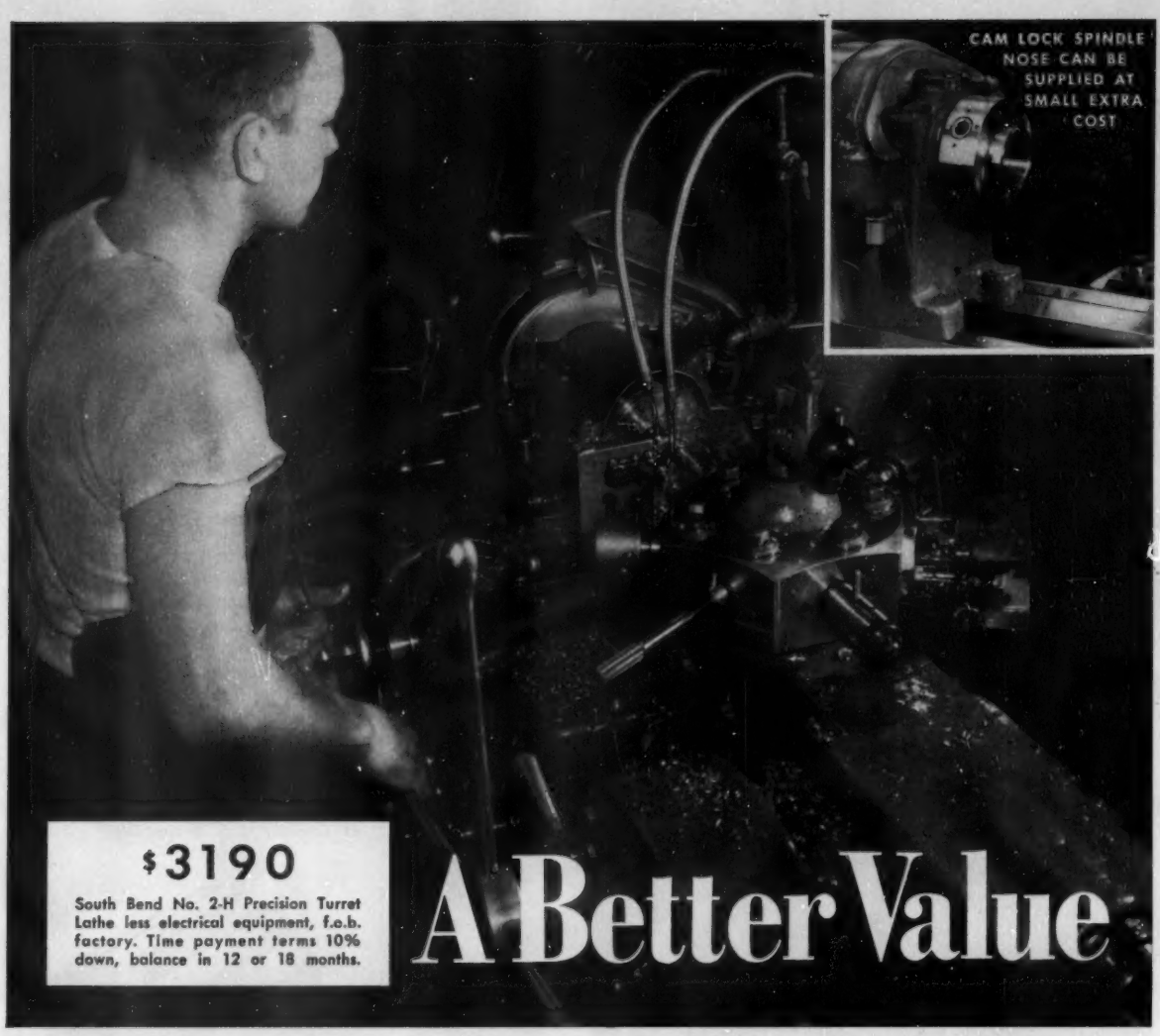
Weight sensing element is tubeless electrical unit sealed in steel casing.

Control Cells Corp, Suite 201, 511½ North Hillside, Wichita 6, Kansas



Drillpress Vise

Dril-Lox is for drill presses. Drill torque on the work automatically locks the vise and pieces in vise find their own center. Attachment is fastened to table by spinning two thumb nuts. Work is first inserted between



$3190

South Bend No. 2-H Precision Turret Lathe less electrical equipment, f.o.b. factory. Time payment terms 10% down, balance in 12 or 18 months.

A Better Value

SPECIFICATIONS

Hole through spindle	1⅜"
Maximum collet capacity	1"
Swing over bed	16¼"
Spindle speeds (Approx.)	20 to 945 r.p.m.
Effective feed of turret	5⅞"
Diameter of holes in turret head	1½"
Thread cutting range	4 to 224 per in.
Motor required (Two-Speed)	2 - 1 h.p.

The South Bend No. 2-H Turret Lathe has the stamina for exacting close-tolerance work, rigidity for producing fine finishes and ample power for smooth performance. It also has full quick change gear mechanism providing 48 power feeds for the turret ram, 48 power longitudinal feeds for the universal carriage and 48 power cross feeds for the double tool cross slide. The wide selection of feeds insures maximum machining efficiency on every type of operation. Where can you find a better turret lathe value?

Compared with our costs
OUR PRICES ARE LOWER
than they were back in 1941

Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

PLEASE SEND INFORMATION CHECKED:

☐ 9" and 10" BENCH LATHES

☐ 10" to 16-24" FLOOR LATHES

☐ DRILL PRESSES

☐ ½" & 1" Collet TURRET LATHES

☐ TOOL GRINDERS

☐ 7" BENCH SHAPERS

Name _____ Street _____

City _____ State _____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

PEARLITIC MALLEABLE CASTINGS

If service conditions are unusually rugged and you're troubled by high manufacturing costs—look to pearlitic malleable castings!

Pearlitic malleable has high fluidity that casts easily into complicated shapes. It resists wear under heavy loads at high speeds . . . has high ultimate strength . . . possesses excellent non-seizing properties for bearing surfaces . . . can be given a very smooth finish where desired . . . and can be either liquid quenched or air quenched. And perhaps *most important of all, pearlitic malleable machinability index ranges from 80 to 90* (B1112 steel = 100).

So look your product over critically. Then check pearlitic malleable castings. They can replace more expensive methods of fabrication or manufacture . . . can lead to reduced weight, less machining time . . . fewer assembly operations . . . *greater sales appeal for your product.* AA-186

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY
Cleveland 6, Ohio

The Nation's largest independent producer of malleable and pearlitic malleable

rails and then floated to spindle.

Four sizes are offered with capacities ranging from 5¼ to 8¼ in. Prices range from $25 to $33.50.

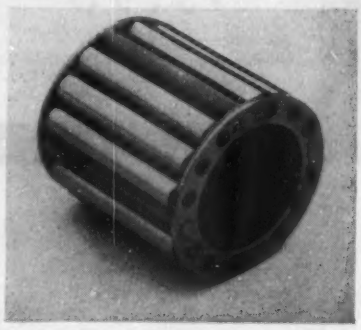
Price and Rutzebeck, 22150 Meekland Ave, Hayward 85, Calif

Quick Fastener Cuts Costs 80%

Q-4 quarter-turn blind fastener, applied from one side only, is reportedly well adapted to take-up in commercial sheet metal tolerances. Once snapped in place, unit is self-retaining in outer sheet or panel, eliminating loss of parts in servicing.

Unit, said to cost only a fifth as much as most quick-operating fasteners, has been designed to resist severe and prolonged vibration.

Shakeproof, Div, Illinois Tool Works, St Charles Rd, Elgin, Ill



Steel Cage Roller Bearing

Steel cage roller bearing is a self-contained unit and can be used without inner or outer race. It can also be installed directly in bores of hardened gears or housings of limited boundary dimensions and can support heavy bearing loads.

Idler gear and idler stud are heat-treated and ground to same hardness and finish as normally would be bearing's inner and outer races.

Bearing shown above supports reverse idler gears and truck transmission. Its rollers are 5/16 in. in dia and 2 in. long, and load rating at 1500 rpm is 2300 lb.

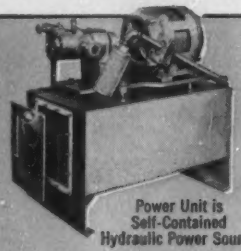
Dept STC, Roller Bearing Co, Inc, Syracuse, NY

VICKERS® ...the MOST EXTENSIVE LINE of hydraulic units complying with JIC STANDARDS

Shown here are only a few representative standard Vickers units that comply with JIC Standards . . . standards that are directed toward ease of maintenance, safety, longer life and uninterrupted machine production. "Undivided Responsibility" is another important advantage gained by specifying Vickers Units throughout a hydraulic system. For further information ask for new Bulletin 5002.

PUMPS

Vane Pump · Two Stage Vane Pump (2000 psi) · Double and Two-Pressure Vane Pumps · Variable Delivery Piston Type Pump



Power Unit is Self-Contained Hydraulic Power Source

PRESSURE CONTROLS

Balanced Piston Type Relief Valve · Hydrocushion Type Sequence Valve · Hydrocushion Type Counterbalance Valve · Pressure Reducing Valve

Flow Control Valve with Hydrostatic Compensator

DIRECTIONAL CONTROLS

Rotary Type Four-Way Valve · Plunger Type Four-Way Valve · Pilot Operated Four-Way Valve · Solenoid Controlled Pilot Operated Four-Way Valve · Check Valve · Manually Operated Four-Way Valve · Solenoid Operated Four-Way Valve · Deceleration Valve

MOTORS

Constant Displacement Piston Type Motor · Variable Displacement Piston Type Motor · Balanced Vane Type Motor · Hydraulic Cylinders

ACCESSORIES

Accumulators · High Pressure Type Micronic Oil Filters · Traverse and Feed Cycle Control Panel

6865

WRITE for your copy

Vickers Circuitool consists of a handy, transparent plastic guide and a 24-page manual to speed the drawing and to promote symbol (JIC) uniformity of hydraulic circuits.

VICKERS Incorporated

DIVISION OF THE SPERRY CORPORATION

1410 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices:

ATLANTA • CHICAGO AREA (Brookfield) • CINCINNATI CLEVELAND • DETROIT • HOUSTON • LOS ANGELES AREA (El Segundo) • NEW YORK AREA (Summit, N. J.) • PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt. Lebanon) ROCHESTER • ROCKFORD • SAN FRANCISCO AREA (Berkeley) • SEATTLE • TULSA • WASHINGTON • WORCESTER

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

CLEVELAND WORM & GEAR CO. cuts tool crib costs . . . increases shop efficiency with McCASKEY

Numerous benefits are secured thru McCaskey Tool Crib Control in the plants of the Cleveland Worm & Gear Company and their affiliate, The Farval Corporation, manufacturer of "Centralized Systems of Lubrication." Mr. Edward F. Mason, Tool Engineer of both, recently reported a few as follows:

"When the McCaskey system (shown in the illustrations) was installed, we discovered we were overstocked with tools not often used and understocked on some in regular use. A large part of our Worm & Gear production is custom-made, but with the information now available, emergency tool orders are practically eliminated.

"Prevention of hoarding by some of our employees has increased the number of tools available for others without additional purchases.

"Tool Location Boards show at a glance where each tool is stored in the crib. As a result, tools seldom are lost or mislaid and waiting time at the crib window and production delays are reduced to a minimum.

"Our Broken Tool Reports are analyzed as an indication of trouble. Any unusual breakage is reported to the proper department for investigation and total breakage has been cut to a very small figure.

"These and numerous other benefits from the McCaskey installations made in 1942 and 1946 continue to provide lower operating costs in the tool cribs and increased efficiency in the shops."

McCaskey Tool Crib, Gage and Blueprint Controls offer you comparable "benefits" regardless of the size of your plant or your products.

MAIL COUPON FOR FURTHER DETAILS

Victor Adding Machine Co.
McCASKEY INDUSTRIAL DIVISION
900 N. Rockwell Street
Chicago 18, Ill.

Please send me all the facts concerning McCaskey Tool Control ☐; Gage Control ☐; Blue Print Control ☐.

Name .....

Position .....

Company .....

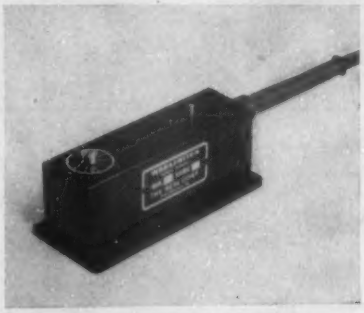
Address AM-11-54

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION - INVENTORY
TOOLS - MAINTENANCE - COSTS
THE McCASKEY REGISTER DIV.,
Victor Adding Machine Co.
ALLIANCE, OHIO
Galt, Canada Watford, England

Weller Sander Has Straight-Line Action

Vibrator electric sander, Model 700, has 25-sq in. sanding area and low design which permits use in restricted places. It is reported ideal for rubbing, waxing, and polishing. It vibrates at 14,000 spm; 60-cycle reciprocating motor. Rubber insulators between housing and motor give smoother and quieter operation. Price is $14.95.

Weller Electric Corp, 808 Packer St, Easton, Pa



Vibraswitch

Vibraswitch may be used for vibration measurements or in a permanent installation as protective monitoring switch to actuate warning when vibration exceeds normal value by preadjusted amount. Flat response from 0 to above 200 cps permits use of device on almost all types of rotating or vibrating equipment. Internal SPDT resettable switch may be used to control circuits at up to 5 amps with vibratory displacement increases of as low as 10 mu-in. at 12,000 rpm. Range is 0 to 2G, or 0 to 800 ipss with an accuracy of ± 0.05G.

The Beta Corporation, Box 8625, Richmond 26, Va

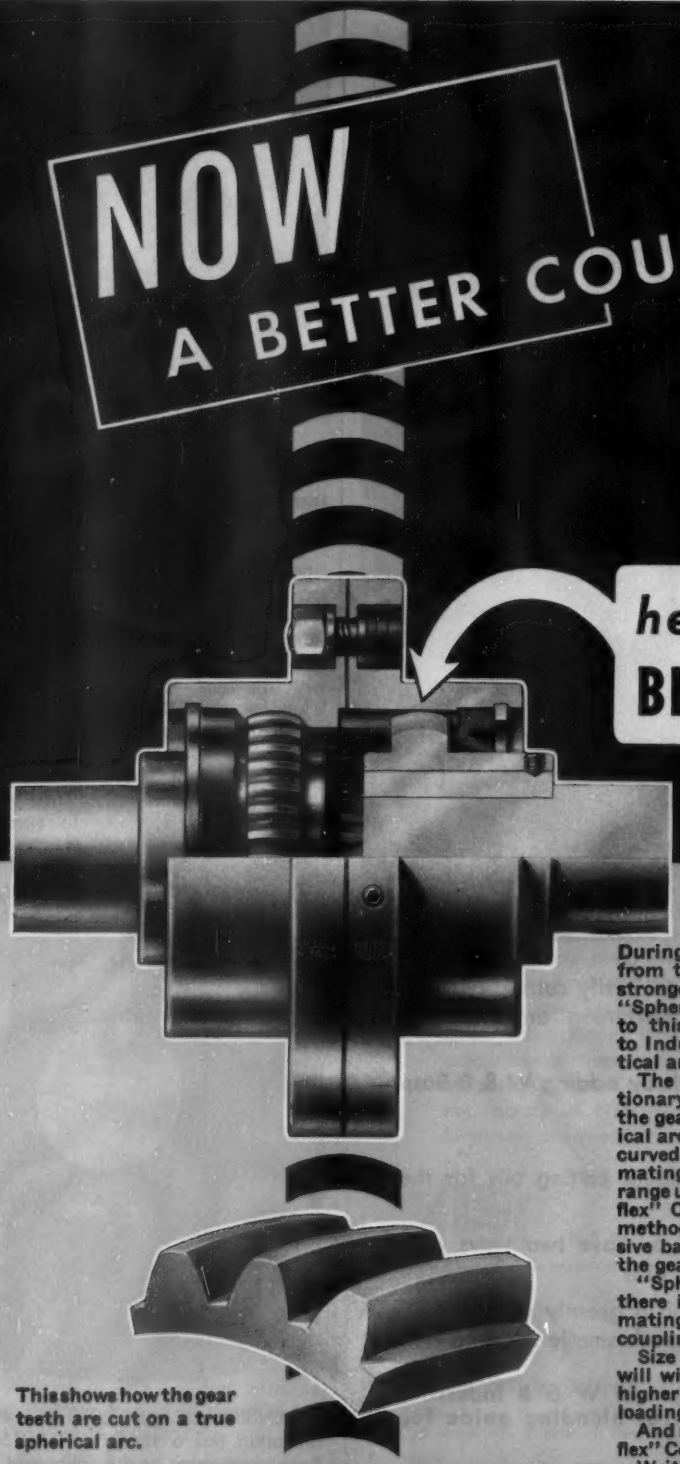
Automatic Mill Control

Unit provides automatic correction of thickness variations in materials being rolled. Model E may be used with any continuous mill gage and with any electrically operated screwdown motor. Desired tolerances are set by means of potentiometers.

Pratt & Whitney, Div Niles-Bement-Pond Co, West Hartford 1, Conn

NOW A BETTER COUPLING

SPHEREFLEX



here's the
BIG DIFFERENCE

This shows how the gear teeth are cut on a true spherical arc.

During recent years there has been a demand from the Aircraft Industry for a more flexible, stronger Gear Coupling. Although Philadelphia "Sphereflex" Coupling was developed in answer to this special need, it is now being offered to Industry in a complete line of standard, vertical and floating shaft couplings.

The "Sphereflex" Coupling utilizes a revolutionary new principle of coupling design, in that the gear teeth are precision cut on a true spherical arc. Since even the root of the gear tooth is curved, there can be no interference between mating gear teeth, even when shaft deflections range up to 7° total mis-alignment. The "Sphereflex" Coupling is in radical contrast to former methods of obtaining flexibility through excessive backlash or merely chamfering the tips of the gear teeth.

"Sphereflex" is a stronger coupling, because there is always a full line of contact between mating gear teeth, regardless of whether the coupling is flexed or perfectly aligned.

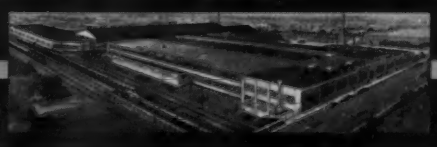
Size for size, the new "Sphereflex" Coupling will withstand more deflection, greater torque, higher rotating speeds, and more severe shock-loading than comparable couplings.

And remember, you pay no more for a "Sphereflex" Coupling than other good quality couplings.

Write for Catalog C-540.

PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.



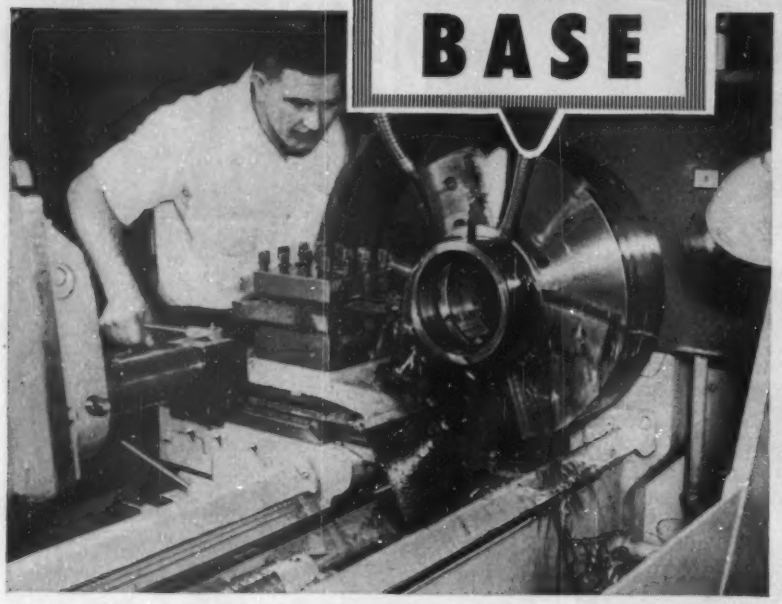
Industrial Gears & Speed Reducers

LimiTorque Valve Controls

IMPROVE

your TOOL LIFE and FINISH with... W+B BASE

General production on a Warner & Swasey lathe on nickel chrome steel — using W & B Base.



W & B BASE is a concentrate to fortify cutting oils and straight petroleum oils for machining and drawing operations.

Blend your own specialized oils by adding W & B Base to inexpensive petroleum oils.

OR

Add W & B Base to your present cutting oils for the more difficult jobs.

When you use W & B Base you save two ways over buying specially ready-mixed oils:

1. Cost per gallon of oil is greatly reduced;
2. Inventory of oils is much smaller.

Write for new catalogue of W & B Industrial Lubricants with helpful blending guide for W & B Base.

W+B INDUSTRIAL LUBRICANTS

THE WHITE+BAGLEY CO.

WORCESTER, MASS. • DETROIT, MICH.

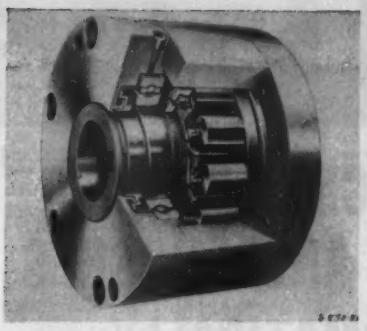
Originators of Grinding Lubricants

Dual Head Resistance Welder

Resistance welder of 1-kva capacity has dual heads which can be indedependently adjusted for pressure, time, and heat. Electrodes and holders are adjustable in all directions to permit wide variety of setups. For handling small parts, welder is sold as complete package containing welding heads, timers, controls and transformer. Air cooled ⅛ or 3/32 in. electrodes are used. Electronic timers use cold cathode thyratrons. Welding current passes through electrodes and holders only. Unit operates from 220-v, 60-cycle current, and handles strips and wires to 1/32 in.

Royson Engineering, Hatboro, Pa

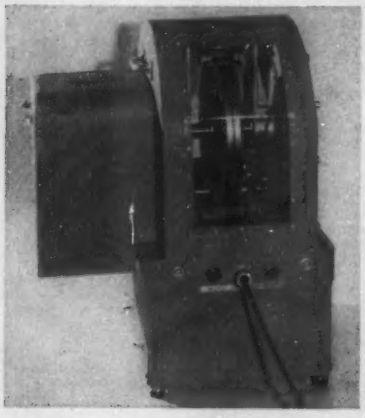
DIMENSIONAIR with 5,000 to 1 magnification has a range of 0.0015 in. Each graduation on the calibrated dial is equal to 0.000020 in. Long range makes it easier to insert gaging plugs; approach range is also long. Differential air circuit makes precise calibration of scale possible which means only one master is needed to set Dimensionair —*Federal Products Corp, 1144 Eddy St, Providence 1, RI*



Heavy Duty Cam Clutches Do Indexing and General Duty

Line of ball-bearing over-running clutches for indexing, backstop, and general duty machinery applications, K series, have a toothed inner race driving member that actuates closely spaced, independently sprung cams. Tapped holes are provided in both ends of clutches for attaching sprockets, or ratchet arms, for drive requirements from 1300 to 6000 ft-lb. Clutches are made in four standard sizes having 8¾, 10, 12, and 15-in. OD. Each has made-to-order bore and keyway sizes.

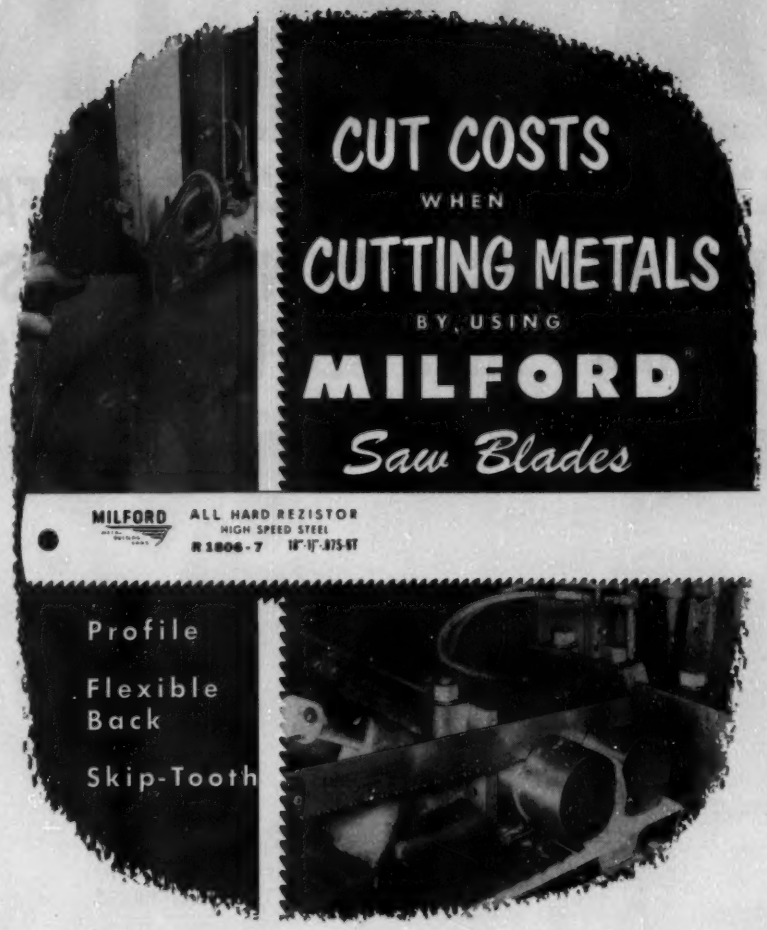
Morse Chain Co, 7601 Central Ave, Detroit 10, Mich



Proportional Synchronizer Stores Meter Readings

Device stores meter readings of various magnitude and reproduces information at later period in a process, synchronized with the speed or movement of line. Meter readings from gage is applied to memory unit through a self-balancing electronic control circuit.

An example of use is where steel strip of varying thickness is being formed into tubing and seam welded. Welding current must be varied in accordance with thickness of strip. Since it is impractical to measure thickness at point of welding, it is done before forming into a tube. Syn-



The proof of performance can be shown from a practical demonstration in your plant with your materials and equipment. See for yourself how Milford Hack Saw and Band Saw Blades cut metal with consistent speed, accuracy and economy because of built-in quality that means increased production at lower costs. Take advantage of more than 75 years' experience in the manufacture of quality blades. Contact your nearby Milford distributor or write the factory at New Haven, Connecticut. Factory-trained Field Engineers are ready to give you on-the-job service.

THE HENRY G. THOMPSON & SON CO.
Saw Blade Specialists for Over 75 Years
NEW HAVEN 5, CONNECTICUT

Profile Blades and Band Saw Blades, Hand and Power Hack Saw Blades

THE HENRY G. THOMPSON & SON CO., NEW HAVEN 5, CONN.

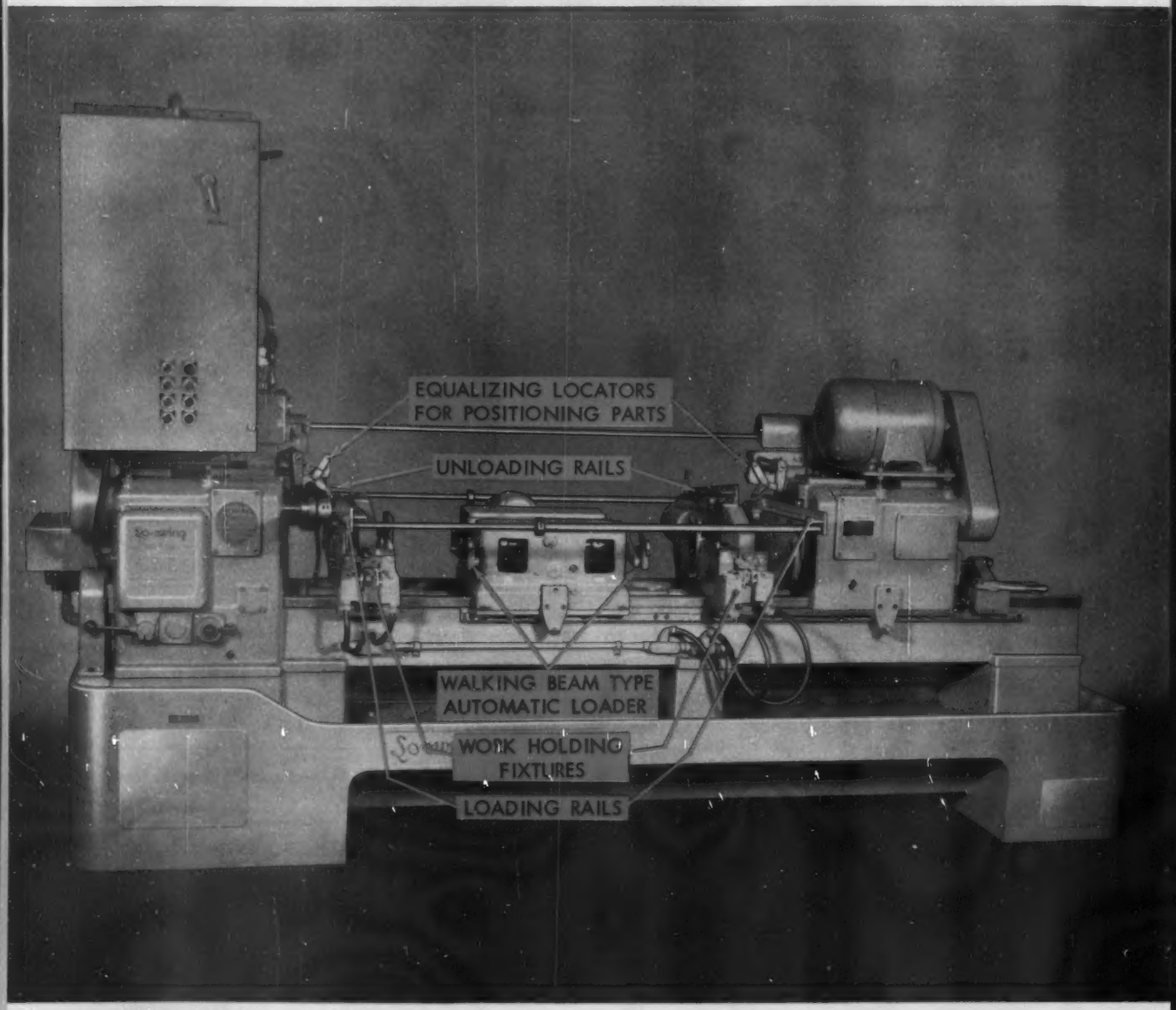
☐ Please send the MILFORD Metal Cutting Catalog.
☐ I would like a MILFORD demonstration in my plant.

NAME _____
POSITION _____
COMPANY _____
COMPANY ADDRESS _____
CITY _____ ZONE _____ STATE _____

SOLD THROUGH SELECT INDUSTRIAL DISTRIBUTORS

MACHINE OF

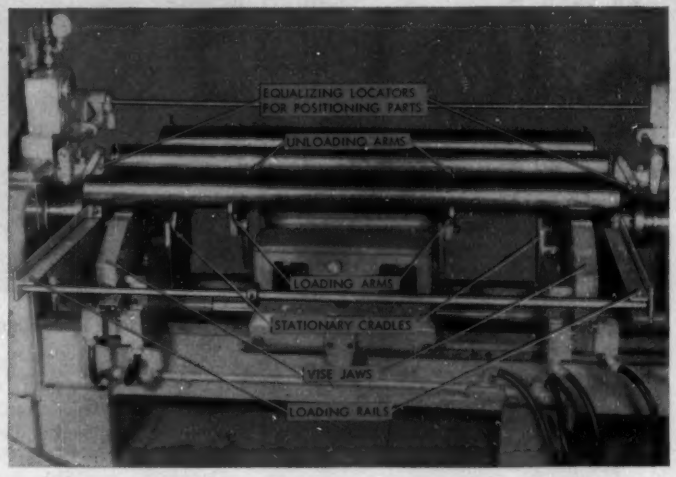
MODEL "CS" *So-swing* FACING AND CHAMFERING MACHINE HANDLES AND FINISHES BOTH ENDS OF TUBING AUTOMATICALLY



PRODUCTION COSTS

THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

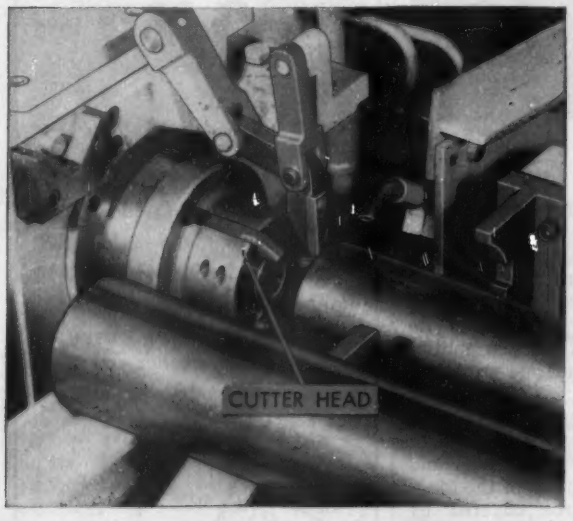


PROBLEM: To automatically load and unload Propeller Shaft Tubes, face to length and chamfer inside and outside diameters of both ends simultaneously.

SOLUTION: The Model CS Lo-swing selected for this job was equipped with a special Automatic Handling Mechanism and special vises, as shown on the opposite page. A close-up view of the working area of the machine with a rough tube clamped in the vise jaws and finished tubes leaving the machine on the conveyor rails at the rear is shown at the right.

The tubes arrive at the machine by conveyor and roll down to a fixed stop on the loading rails. At the end of the machine cycle, the cutter heads retract and the vises open, allowing the finished part to drop into a stationary cradle, which is positioned slightly lower than the center line of the vise jaws. An electrical contact then starts the work carrier motor imparting a rotating movement to the work carrier arms which handle a rough and finished piece simultaneously.

The unloading arms remove the finished piece, depositing it on the conveyor rails leaving the machine, while the loader arms, in their trajectory, pick up a rough part and lower it into the stationary cradle for automatic positioning by the equalizing locators shown above. These locators assure removal of an equal amount of material from both ends of the tubes. The vise jaws close automatically as soon as the tube is correctly positioned. The machine starting clutch is then automatically engaged and the part faced to length and chamfered on both ends. Since the entire operation is automatic, no operator is required.



The illustration at the left is a close-up view of one of the machining heads, showing one of the equalizing locators in contact with the work. Part of one of the cutter heads, fitted with three tools for the facing and chamfering operation, can be seen in this view.

Seneca Falls engineers are at your disposal to assist in solving your AUTOMATION problems.

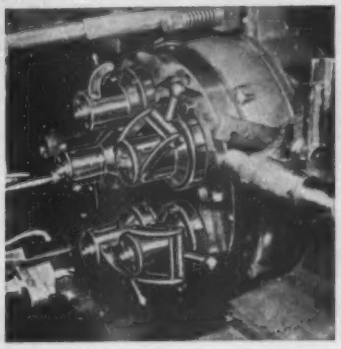
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

ARE LOWER WITH Lo-swing

LET

Zagar Tools "GANG UP"

on your multiple machining

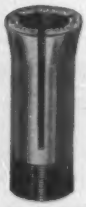


Singly or in combination, Zagar holding and indexing fixtures can expedite your work. Zagar shows you the *inexpensive* way, eliminating many special set-ups. Zagar provides the *effective* way, because work is held rigidly during machining. Zagar fixtures are not too costly. They are stocked for quick delivery.

♦ ♦ ♦

Zagar 1" indexing fixture

Zagar 2" holding fixture



Zagar 5-C pull type collet

ZAGAR COLLETS & FIXTURES *HOLD BUSINESS FOR YOU!*

Machining work held by Zagar fixtures spells fast, accurate production for you. Accurate production spells profit and a worthwhile end product. Whether it's your own job or a customer's, production is materially assisted by Zagar fixtures and collets.

♦ ♦ ♦

WRITE FOR BULLETIN "A-11"

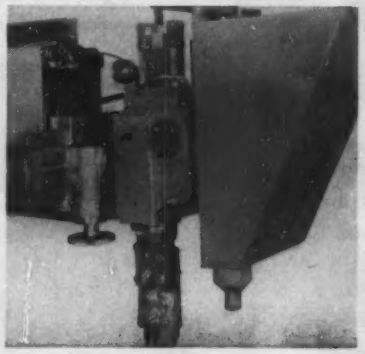
ZAGAR TOOL, INC.

24000 LAKELAND BLVD., CLEVELAND 23, O.

Zagar TOOLS For INDUSTRY and SPECIAL MACHINERY

chronizer conveys information on thickness between point of measurement and point of welding, and controls welding current accordingly.

Pratt & Whitney Div, Niles-Bement-Pond Co, West Hartford 1, Conn



Welding Head Positioner

Welding head can be adjusted for variety of operations calling for lateral movement, angular, or 90° stationary positioning, with an attachment called Uneek Head Mount.

Device is available for use with all standard welding heads and is easily mounted on any welding fixture.

Cecil C Peck Co, 4614 Prospect Ave, Cleveland 3

Magnetic Particle Inspection Kit

It is reported to offer light weight, portability, and low cost. Designated Y-5 yoke kit, it comes in metal carrying case and weighs less than 30 lb. Yoke itself is magnetizing and testing instrument weighing 7 lb. Magnaflux powder, powder bulbs, and operating instructions complete the kit.

One man performs inspection. He handles the yoke in one hand, both power control and positioning, and with the other he dusts on the Magnaflux powder. Area covered by each application varies up to approximately 24 sq in.

Magnaflux Corp, 7300 W Lawrence Ave, Chicago 31, Ill

CUSTOM STAMPINGS

ARE

RIGHT DOWN OUR ALLEY

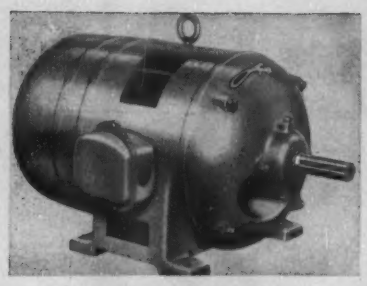
For more than 30 years Powell has been supplying the automotive, appliance and allied industries with cost-reducing, quality stampings. Make sure the name Powell is on your list for production stampings and partial assembly. For information contact —

POWELL PRESSED STEEL

PCS

CUSTOM STAMPING DIV.

THE POWELL PRESSED STEEL CO., HUBBARD, OHIO

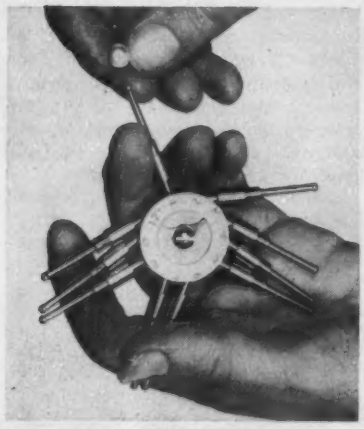


Louis Allis Integral Brakemotor Has Shorter Over-all Length

Shorter length of integral brakemotor is made possible by utilizing motor and bracket as integral part of brake. Units utilize disk brakes and are available in NEMA motor frame sizes from 203 to 326. They are designed to furnish maximum continuous-duty torque from 3 ft-lb to 50 ft-lb.

Additional advantages include: external wear indicator to indicate the brake is properly operating at each engagement; rugged construction with cast iron external parts; dependable brake lever system; maximum solenoid-gap limit; and extra electrical protection.

Louis Allis Co, Milwaukee 7, Wis



Multiple Precision Gage

The Microsphere multiple precision gage consists of ten measuring spheres in any increments desired, starting at 0.0001 in. Gage is used to make immediate check on size of hole being produced during any part of operation. Complete set of gages can be carried in pocket-size leatherette case for on-the-spot inspection. Spheres are manufactured to an accuracy of + 0 and – 0.000025 in. and can be obtained in both tool steel and hard chrome. They are available in sizes beginning in 1/16 in., increments of 1/64 in. up to ½ in.

The Merz Co, Box 24605 Village Station, Los Angeles 24, Calif

for a fabulous finish...

Jewel Brand

ABRASIVE BELTS

for grinding, sanding, polishing — metal, wood, leather, plastics, rubber.

ABRASIVE PRODUCTS, INC.
561 Pearl Street
South Braintree 85
Massachusetts

New G-E TRI 55 CLAD Motors

REG. U.S. PAT. OFF.

NOW AVAILABLE THROUGH 10 HP!

Prompt Service, Quantity Shipment on these new motors...

TRI/CLAD '55' MOTORS—3-PHASE, 60 CYCLES, NEMA DESIGN B

HP	3600 RPM	1800 RPM	1200 RPM	900 RPM
½				K182 220/440v*
¾			K182 220/440v*, 550v	K184 220/440v*
1		K182 208v, 220/440v*, 550v		
1½	K182 220/440v*, 550v	K184 208v, 220/440v*, 550v	K184 220/440v*, 550v	K213 220/440v*
2	K184 220/440v*, 550v	K184 208v, 220/440v*, 550v	K213 220/440v*, 550v	K215 220/440v*
3	K184 220/440v*, 550v	K213 208v, 220/440v*, 550v	K215 220/440v*	K254U 208v*, 220/440v*, 550v*
5	K213 220/440v*	K215 208v, 220/440v*	K254U 208v*, 220/440v*, 550v*	K256U 208v*, 220/440v*, 550v*
7½	K215 220/440v*	K254U 208v*, 220/440v*, 550v*	K256U 208v*, 220/440v*, 550v*	
10	K254U 208v*, 220/440v*, 550v*	K256U 208v*, 220/440v*, 550v*		
15	K256U 208v*, 220/440v*, 550v*			

...and fast delivery on Sample Motors through 20 hp!

7½				284U 208v*, 220/440v*, 550v*
10			284U 208v*, 220/440v*, 550v*	286U 208v*, 220/440v*, 550v*
15		284U 208v*, 220/440v*, 550v*		
20	284U 208v#, 220/440v#, 550v#	286U 208v*, 220/440v*, 550v*		
25	286U 208v, 220/440v, 550v			

*** Indicates totally-enclosed motors also available.**
 # Dripproof only, TEFC available in 286U frame.

All motors obtainable with NEMA "C" face and "D" flange end shields, foot mounted or round frame. Splashproof motors in all ratings.

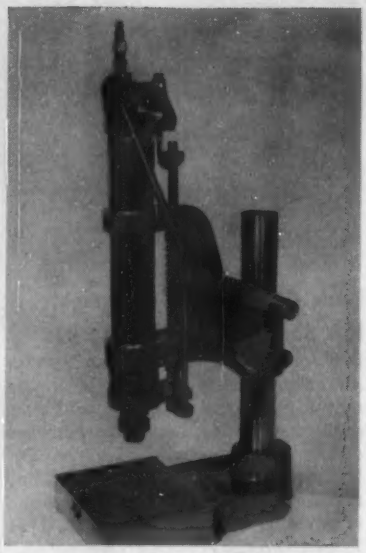
Motors can also be obtained for 50 cycles. 254 and 256 frames available in high starting torque or high slip NEMA designs C or D, except 3600-rpm motors.

There is prompt service on specials in the above sizes, too! Also new Tri/Clad '55' single-phase, wound-rotor, and hermetic motors are available.

If you wish the G-E Tri/Clad motor in the original design, they are still available . . . in ratings listed above and in ratings to 2000 hp.

To get even more recent availability information on standard and special motors, contact your nearest G-E Apparatus Sales Office or G-E motor supplier. *General Electric Co., Schenectady 5, N. Y.* 648-22

GENERAL ELECTRIC



Air-Operated Impact Machine

Model 2-CSB is smaller version of 3-VS. It is essentially a single-stroke air hammer, with hammer moving through closed cylinder and impact force transmitted by toolholding chuck. Length of hammer stroke is constant, and force of impact is adjusted by regulating volume of incoming air. Surge chamber is at upper end of cylinder. Impact range is from zero to 7,000 lb.

Pedal lowers operating cylinder until tool makes contact with work. After contact, further light pedal pressure triggers hammer stroke by opening the air valve. Use of hand lever for traverse is optional.

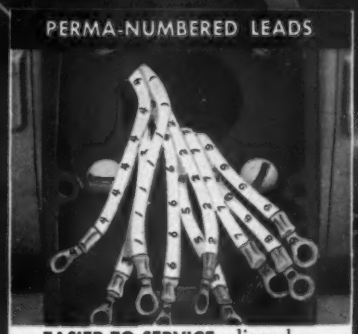
Heidrich-Nourse Co, 631 E Third St, Los Angeles 13, Calif

Heat-Sensing Cell

Photoconductive cells, designated Ektron Detectors, have extreme infra-red sensitivity.

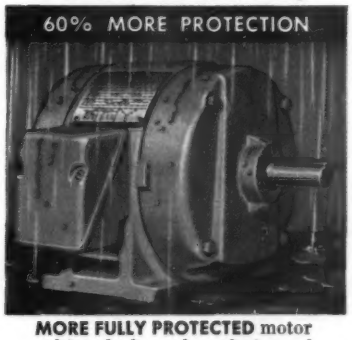
One suggested use for the detectors is in complex electrical equipment where mechanical switching devices are too bulky or insufficiently reliable. The detector permits a beam

TRI 55 CLAD THE LEADER IN MODERN MOTOR DESIGN



EASIER TO SERVICE, clipped or taped terminals always can be read. You save hooking-up time.

LARGE CONDUIT BOX is diagonally split—gives you ample knuckle room for easier wiring.



MORE FULLY PROTECTED motor achieved through redesign of cast iron frame and end shields.

NEW BEARING SYSTEM means the G-E motor runs longer without relubrication than any other.

Now, easier installation, less maintenance...

G.E.'s new TRI 55 CLAD motor—you can install it and forget it!

REG. U.S. PAT. OFF.

The all-new General Electric Tri/Clad '55' motor is specially engineered to reduce your installation costs . . . and run longer, without attention, than ordinary motors. This new motor gives you 60% more physical protection plus longer electrical life. In addition, a bearing system designed to use the most modern greases means you will not have to regrease the Tri/Clad '55' for years.

You save with the new Tri/Clad '55' because wiring is easier and faster. The large, diagonally split conduit box gives you plenty of knuckle room. Leads are perma-numbered . . . you can always identify them instantly.

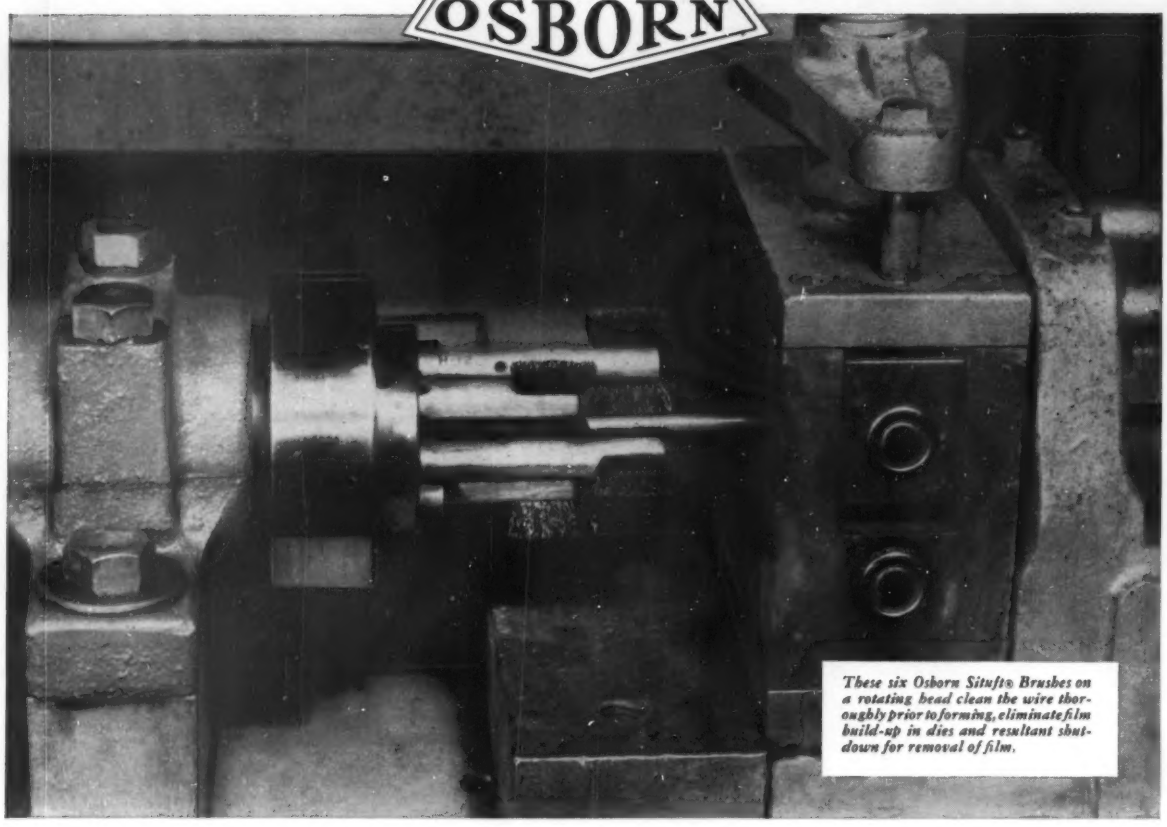
The new Tri/Clad '55' also brings you important handling, storing and installing economies. Better use of space within the frame means a 30% reduction in size and weight in some ratings. Yet active materials (magnetic steel and copper) are not sacrificed.

General Electric Tri/Clad '55' motors are now available in many ratings. The complete line of 1 to 30 hp a-c motors will be available soon. For full details contact your G-E Apparatus Sales Office or G-E Motor Supplier today. Write for Tri/Clad '55' bulletins GEA-6013—Dripproof motors, GEA-6012—Enclosed motors, GEA-6027—Gear-motors. General Electric Company, Section 648-7, Schenectady 5, N. Y.

Progress is our most important product

GENERAL ELECTRIC

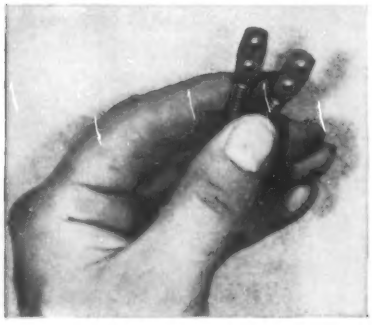
OSBORN



These six Osborn Situfto Brushes on a rotating head clean the wire thoroughly prior to forming, eliminate film build-up in dies and resultant shutdown for removal of film.

Eliminates downtime

HOW CAN YOU SAVE WITH AN OBA?



THE spade weld screws shown here are made from wire. The problem was to clean the wire prior to forming screws. Former cleaning method caused frequent lengthy shutdowns of press for removal of film build-up in dies. Now, the Osborn Power Brushing setup shown cleans the wire thoroughly, eliminates costly downtime.

Your nearby Osborn Brushing Specialist is constantly helping to make savings like this by studying the cleaning and finishing operations in all kinds of plants and giving a written report with recommendations for improvements. Why not have him make this **O**sborn **B**rushing **A**nalysis in your plant? There is no obligation. Call or write *The Osborn Manufacturing Company, Dept. C-26, 5401 Hamilton Ave., Cleveland 14, Ohio.*

Osborn Brushing Analysis

TO HELP YOU DISCOVER HIGHER QUALITY AND LOWER COSTS WITH POWER BRUSHING

of light to eliminate the moving part. Units have been exhibited in the form of multiple arrays of as many as 20 pinpoint specks of lead sulfide on less than an inch of glass.

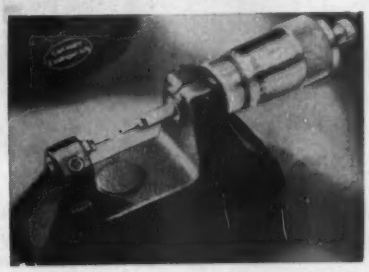
Eastman Kodak Co, Rochester 4, NY

GE Rectifier Welder Meets NEMA Controls

GE states that the welder offers full-time arc force control for holding short arcs with deep penetration. Current range is 20 to 375 amp. Unit uses moving primary coil which provides stepless current control and accurate amperage settings. Windings are aluminum; insulation is silicone.

The automatic arc force control is optinal. Cooling for coils and rectifier stacks is provided by forced-draft ventilating fans. Designated 6WR30B, welder is available for 220/440/550-v operation.

General Electric, Schenectady 5, NY



Bench Micrometers

Line of bench micrometers announced by George Scherr has micrometer heads which are Lustro-Chrome full-finished for easy reading. Micrometer screw has hardened and ground thread. Instruments read in 0.0001 in. directly on 1-in.-dia thimble graduated in 250 divisions.

Type 40 G has throat depth of 1.6 in. and tungsten-carbide-tipped measuring surfaces with range from 0 to 0.400 in. Price $46. Type 40 H has non-rotating plunger spindle which adapts eleven different inter-

THE BRIDGEPORT "ABRASAW"

12 TO 20 TIMES FASTER THAN SAW CUTTING

ABRASIVE CUT-OFF MACHINES

MODEL 49-W Heavy duty, 3½" Solids, 5" Tubing or Light Sections . . . Chop Stroke, 18" Dia. Wheel.

HEAVY WEIGHT, PRECISION-MACHINED, DESIGNED FOR LONG, TROUBLE-FREE SERVICE

THESE MONEY-SAVING FEATURES ARE YOURS WHEN YOU SPECIFY BRIDGEPORT:

- Clean, close cuts of ferrous and non-ferrous metals of all kinds, as well as almost any other industrial material, including plastics, glass, ceramics, brick, brake linings, etc.
- The BRIDGEPORT "ABRASAW" cuts 5/8" round cold rolled steel in 1 second; 1" square tool steel in 3 seconds; 2¼" O.D. x 1 13/16" I.D. SAE 1030 tubing in 7 seconds; etc.
- Chop stroke or reciprocating head
- Hand or power operation
- Wet or dry cutting
- Treadle or air operated vise
- Straight or angle cutting
- With or without vise
- Built-in Coolant System
- Surplus power in all models
- Meets strictest of safety requirements
- Write, today, for the new "ABRASAW" Bulletin

LOBDELL UNITED COMPANY

1836 WILMINGTON 99, DELAWARE 1954

A SUBSIDIARY OF UNITED ENGINEERING AND FOUNDRY COMPANY

4 features that add up to 1 fact...

You can depend on JKS Diamond Tools

- Competent Selection of Diamonds
- Modern Plant with Modern Methods
- Qualified Field Representatives, Strategically Located
- Over 65 Years of Successful and Fair Dealing

Send for your copy of our Tool Catalog or perhaps you may wish to consult our engineering staff for assistance on *your* Diamond Tool problem.

J. K. SMIT & SONS, INC.
Murray Hill, N. J.

changeable sets of anvils. Range is 0 to 1 in., reading in tenths. Throat depth 1.280. Price $110 including one pair of anvils.

George Scherr Co, Inc, 200 Lafayette St, New York 12, NY

Oxy-Acetylene Outfit Has Double-Duty Blowpipe

Portable outfit for light-to-medium welding and cutting work features blowpipe with interchangeable welding and cutting tips. Setup welds to 3/16 in. and cuts through 3/8 in. of solid steel.

Unit includes one cutting and three welding tips, oxygen and acetylene pressure regulators, fitted double hose, friction lighter, goggles and wrench.

Linde Air Products Co, Div of Union Carbide and Carbon Corp, 30 E 42nd St, New York 17, NY

Universal Workholder

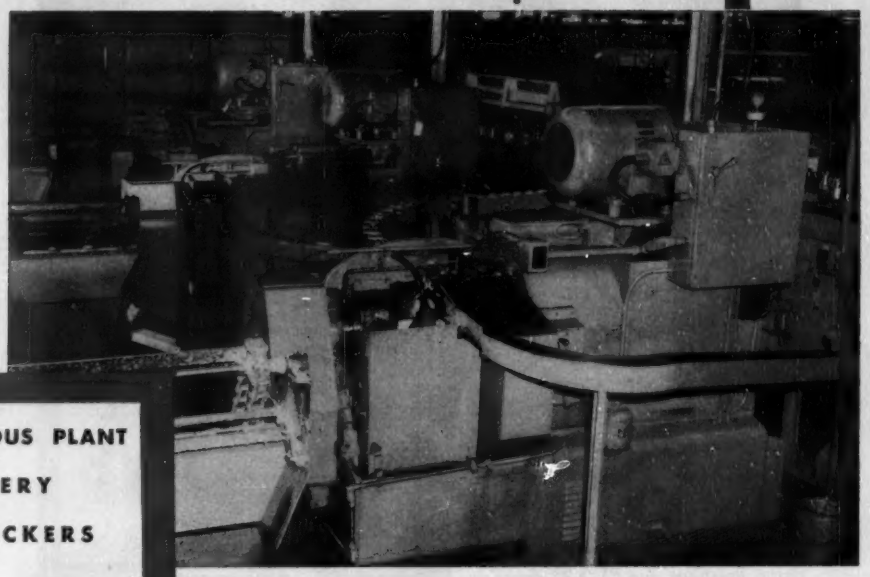
Multi-purpose workholder provides basic tool for many holding applica- Standard interchangeable jaws and clamps for holding single or multiple pieces, hold odd shapes as well as regular. Basic tool is a heavy ribbed casting normalized and precision ground having a base with slots for bolting to machine table. Standards accessories include counter balance weights, drill bushing plate, riser blocks, and work stops.

Compensating clamps for multiple holding are positive, have no springs, and are sealed. Quickacting swing clamp is adjustable. Cam is nested into clamp which assures positive maintained clamping.

Lassy Tool Co, Plainville, Conn

. . . IF IT'S A HIGH PRODUCTION PROBLEM . . .

ASK BAIRD ABOUT IT



ANOTHER WORLD-FAMOUS PLANT
INSTALLS BATTERY
OF BAIRD CHUCKERS

The photo above shows four of a battery of eight Baird 6-spindle automatic Chucking Machines performing the complete turning operations on aluminum alloy pistons . . . including automatic feed and discharge.

The Plant Manager says, "Previous methods of finish-turning required *four* separate operations. Now, the same results are attained in one operation . . . faster and with less chance of error." Cutting speed is 1332 to 1350 ft. per minute . . . feed per revolution .018 to .025. Actual cutting time at each station approximately 5 seconds . . . complete cycle 7.36 seconds.

Baird Chuckers are designed and built to insure positive, continuous, production . . . tooled for precision at low unit costs that give you a definite, competitive advantage.

As automation of large plants advances, Baird automatics can play a vitally important part in your production lines. And Baird engineers, highly experienced in special tooling techniques, offer you solutions for tough production problems. It will pay well to "ask Baird about it."

Write to Dept. AM

THE BAIRD MACHINE COMPANY
STRATFORD CONNECTICUT

WHERE YOU WILL GET THE HELP OF SPECIALISTS ON THESE ESSENTIAL PRODUCTION PROBLEMS:

[redacted]

6BA54

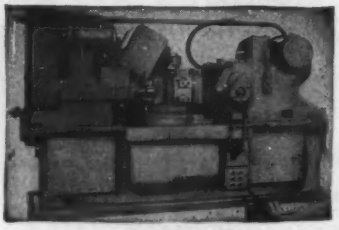
ALL ENDS OF PARTS
Completely Finished
"1·2·3"
ON THE
GOSS *and* DeLEEUW
Automatic Chucking Machine
in 1 SET-UP

This recent Goss & DeLeeuw development has already received universal acclaim as an outstanding development.

In speed, ease of tooling and precision finishing, the "1-2-3" chucker provides engineering advantages which result in vastly greater production at a fraction of parts' costs by other methods.

Easy, fast change-over from job to job makes this machine ideal for short-run requirements. Sturdy construction, power and speed make its advantages apparent on long runs.

"1-2-3" means ability to handle work requiring machining operations on one, two or three ends simultaneously or in sequence — a method exclusive with Goss & DeLeeuw and offered on this machine.



Illustrated literature available promptly on request. Send samples of your work for time and cost estimates.

GOSS & DeLEEUW
QUALITY · PRODUCT · QUANTITY

GOSS *and* DeLEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

ROUND TABLE *Discussion*

GOSSIPING WIVES

How much importance should a foreman attach to a supposed or legitimate gripe existing in the shop which he hears about indirectly? Should he approach the man in an attempt to clear it up?

THIS PROBLEM of the gossiping wives is not too serious at the moment but it is a situation packed with power just waiting to explode. I think that Al had better take his chances on talking to the man with the gripe.

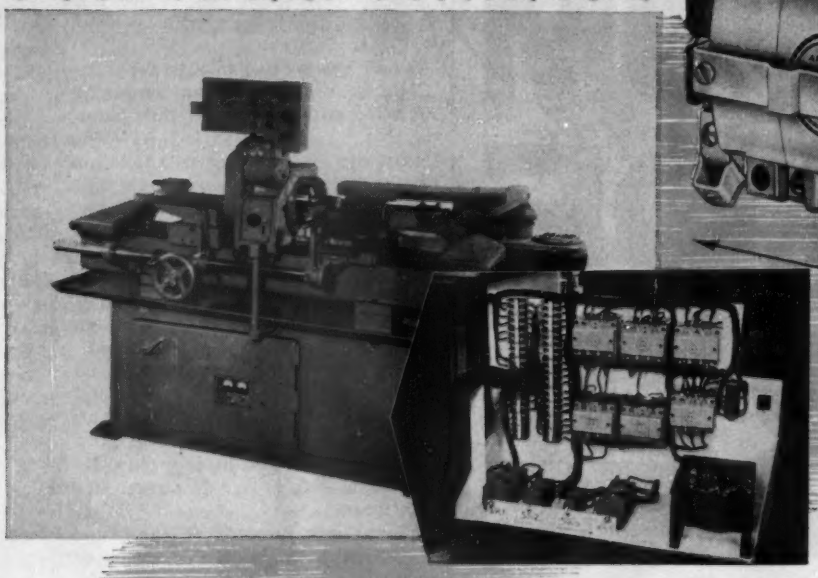
In situations like this I have always found that like mushrooms they grow best in the dark; once started they thrive and beget strength. Of course one must consider the facts in each case, but as a general rule I believe that the best procedure is to drag the problem out into the open. If it is not a legitimate gripe it will promptly die. If the man has a real gripe, at least it is exposed and in a position where the foreman can do something about it.

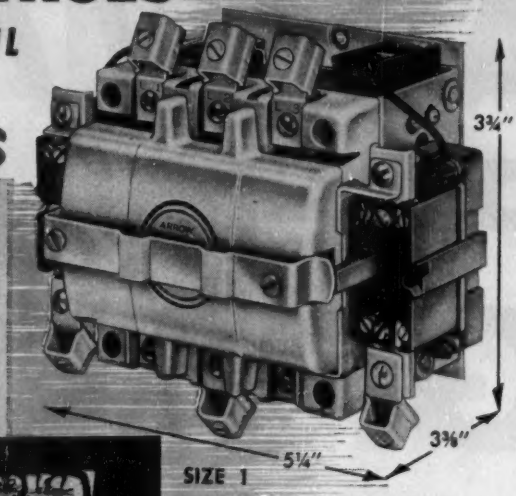
The foreman is in the shop as the representative of management and his decision in all cases should be guided by the primary objective, namely the financial success of the organization. A hidden gripe of this type can spread and lead to disinterest and a general slowdown. I do not think that Al need be concerned about speaking to the man simply because his report of the gripe came forth as a result of "women's talk." If the report is true, then the prob-

"The boss is getting married next week . . . any suggestions??"

Radically Smaller

ADVANCED DESIGN MOTOR CONTROLS HELP THIS NEW AIRFOIL MILLING MACHINE SMASH DEFENSE BOTTLENECKS





SIZE 1

The Model 102 Airfoil Milling Machine, developed and manufactured by the New England Machine and Tool Company of Berlin, Conn., is sold exclusively through Pratt & Whitney Division Niles-Bement-Pond Co. of West Hartford, Conn.

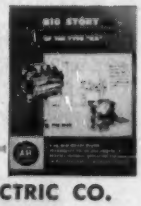
Replacing previous hand methods, this ingenious new machine mills the original, 3-dimensional masters from which turbine blades for jet aircraft engines are manufactured. Reliably accurate masters . . . precision machined and faired to the designers' exact specifications . . . are now produced in ***hours*** where weeks of laborious bench work were once required. Another dangerous bottleneck in our vital defense effort is broken.

Complexity of the operating components in the Model 102 Milling Machine placed a premium on space . . . and space had to be found for 4 across-the-line starters and 1 reversing starter. Bulky controls of conventional design would necessitate a much larger control cabinet and interfere with the machine's easy accessibility from both sides necessary for set up purposes.

Space-saving Arrow-Hart Controls were easily fitted into the machine base. Lighter weight made it practical to mount all 5 starters on an unusually compact door-back panel (with plenty of space left for easy wiring) that swings out for instant accessibility. And these A-H Controls also assure the added benefits of superior performance, greater dependability and longer life.

YOUR ADVANCED DESIGN MACHINES . . . deserve electrical controls that will bring out the full efficiency that you have designed into them. Specify Arrow-Hart . . . you'll be years ahead.

SEND NOW FOR COMPLETE INFORMATION AROUT ARROW-HART ADVANCED DESIGN ▶



SINCE 1890

ARROW • HART
INDUSTRIAL CONTROL DIVISION
103 HAWTHORN ST., HARTFORD 6, CONN., U.S.A.

Offices, sales engineers and warehouses in: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Kansas City, Mo., Los Angeles, Milwaukee, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco. In Canada: Arrow-Hart & Hegeman (Canada) Ltd., Mt. Dennis, Toronto. In England: Arrow Electric Switches, Ltd., Ealing, London W 5.

QUALITY MOTOR CONTROLS • WIRING DEVICES
ENCLOSED SWITCHES • APPLIANCE SWITCHES

INDUSTRIAL CONTROL DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO.
103 HAWTHORN STREET, HARTFORD 6, CONN.

☐ *Please send circular describing A-H Advanced Design Controls.*
☐ *Please send catalog covering the complete A-H Motor Control Line.*

NAME _____
POSITION _____
COMPANY _____
CO. ADDRESS _____
CITY _____ ZONE _____ STATE _____
AM

SPECIFY ADAMAS PREMIUM GRADE 434

for your toughest steel roughing operations including interrupted cuts

- HIGH SHOCK RESISTANCE
- HIGH WEAR RESISTANCE
- HIGH HEAT RESISTANCE
- HIGH DENSITY

Developed especially for removal of large amounts of metal—with minimum feed .015 and maximum feed dependent only on available horsepower—ADAMAS PREMIUM GRADE 434 is outperforming all other carbide grades in hundreds of plants throughout the country.

Plant after plant reports large savings in carbide costs resulting from up to 50% increase in tool life. Next time specify ADAMAS PREMIUM GRADE 434 and watch your production go up and your costs go down.

"First with Carbide That Lasts!"

ADAMAS

TUNGSTEN CARBIDE®

ADAMAS CARBIDE CORPORATION, KENILWORTH, NEW JERSEY

lem is one of ironing out the difficulty and not one of where the report came from.

Of course he could wait until he hears about it from another source, but there is no advantage to that. When he talks to the man with the gripe he can concentrate on the gripe and not on how he heard of it. Any time lost in just waiting leaves the problem in the dark where it is subject to growth and where it is a constant threat to peace in the shop.

H G Koslow
Bronx, NY

AL CAN AND SHOULD TALK to the man. Right or wrong, if a man complains he has a gripe, someone should listen to him.

Usually an employee will take his gripes to the union steward. He will always find him receptive to all complaints. That's what Al should do,—look for an opportunity to serve both line and staff.

Very often a friendly approach is the means of finding there is no gripe, or that there is a simple solution. When the employee has no gripe it is our job to tell him so and why. With a little tact we can always make the employee feel good before we tell him he is wrong. No one of us likes to be told directly we are wrong.

Sometimes someone on the inside is affecting the worker's mind, or possibly it is someone on the outside. Getting mad and telling someone to mind his own business is not the solution. It prevents us from thinking clearly. We all have to do things that should be done whether we like it or not. It is a lesson every foreman and executive must learn. It is a good principle to assume you have made some mistake of your own in

"Think of something quick . . . your father's getting ideas of retiring again . . . I can tell the symptoms . . ."

dealing with the discontented employee.

There is always a reason, and I would search for it. Ask yourself if you correct wisely? Do you understand the employee? Do you try to get his viewpoint? Tactfulness, common sense, and good manners should solve this problem.

A E Salmons
Philadelphia, Pa

AL'S PROBLEM IS NOT CONFINED to foremen exclusively, alas, but is the common heritage of all. Even kings, presidents, cabinet ministers, industrial tycoons have to bend an ear when the little woman suffers one of these social irritations; history is studded with instances where the affairs of state or what-have-you got badly disjointed when the distaff influence was taken too seriously.

Ed's advice would seem to fill the bill in this case. That is, that Al should as tactfully as possible explain to his domestic partner that what happens down at the plant should not appear on the agenda as a topic for discussion at the afternoon bridge club. Maybe too, if Al wants to press his luck, a suggestion that the missus forego a session or two of the ladies' verbal free-for-all might be in order, at least till the conversation returns to a less personal level.

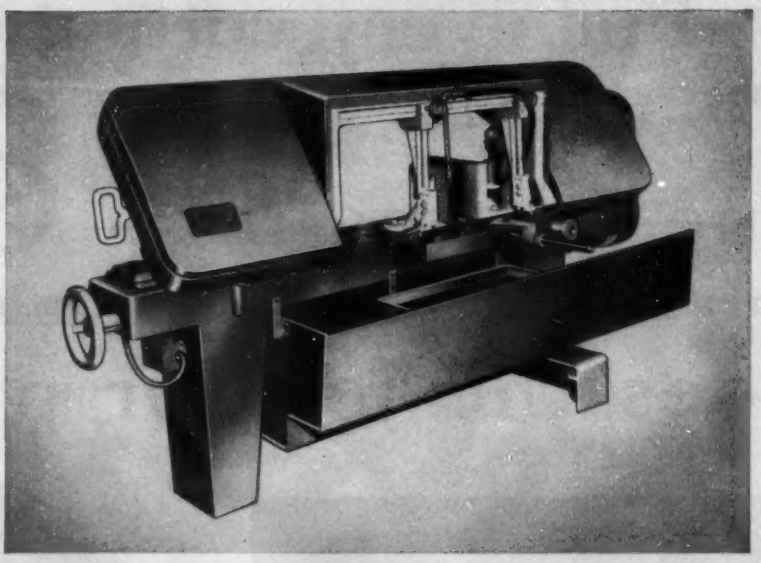
Meantime it wouldn't hurt for Al to contact the fellow whose misdirected gripe was the cause of all the trouble, and have a quiet talk with him, leaving the bridge club hassle out of it entirely. Who knows—perhaps the gripe may be legitimate and not a fancied grievance. At any rate Al owes it to his own peace of mind and the preservation of harmony in shop relations that the matter be ironed out as speedily as possible.

Besides, until he does so, his own domestic weather forecast is going to be cloudy, with occasional showers.

Robert S Alexander
Glastonbury, Conn

WHEN WOMEN SIT AROUND yakking they shoot off their mouths about anything that comes to their minds just to keep their lower jaw in motion. When the party breaks up no one remembers what the other person said unless they are sensitive and interpreted an off-the-cuff remark as a personal dig.

If there is a little alcohol flowing around, the girls really let their hair down and speak their minds. It depends on where you are sitting to find it amusing, boring, hilarious, or



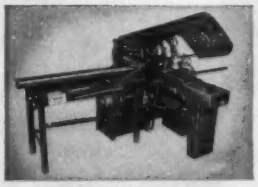
KALAMAZOO

MODEL 1220 METAL CUTTING BAND SAW

big, fast, built to give you high production

KALAMAZOO METAL CUTTING BAND SAW MACHINES . . . a model to meet your needs.

MODEL 8C cuts 8" round, 16" flat, 8" pipe. Coolant equipment and casters available.



KALAMATIC BAR FEED ATTACHMENT converts *Kalamazoo* saws to fully automatic cut-off machines.

MODEL 610 cuts 6" round, 10" flat. Coolant equipment and casters available.

CUTS 12-INCH ROUND, 20-INCH FLAT, 12-INCH PIPE

Accurate to a few thousandths, with minimum burr and kerf.

Four cutting speeds and variable frame weight adjustments provide a selection for various jobs — better sawing results, longer blade life.

Available with coolant equipment for uninterrupted production sawing — without coolant for intermittent cutting and for non-ferrous metals.

Designed throughout for maximum safety. All moving parts fully enclosed — only cutting section of saw blade is exposed.

Heavy duty 1 HP motor provides ample power for all cuts.

ASK YOUR *KALAMAZOO* DEALER FOR DETAILS AND DEMONSTRATION of the rugged Model 1220.

MACHINE TOOL DIVISION

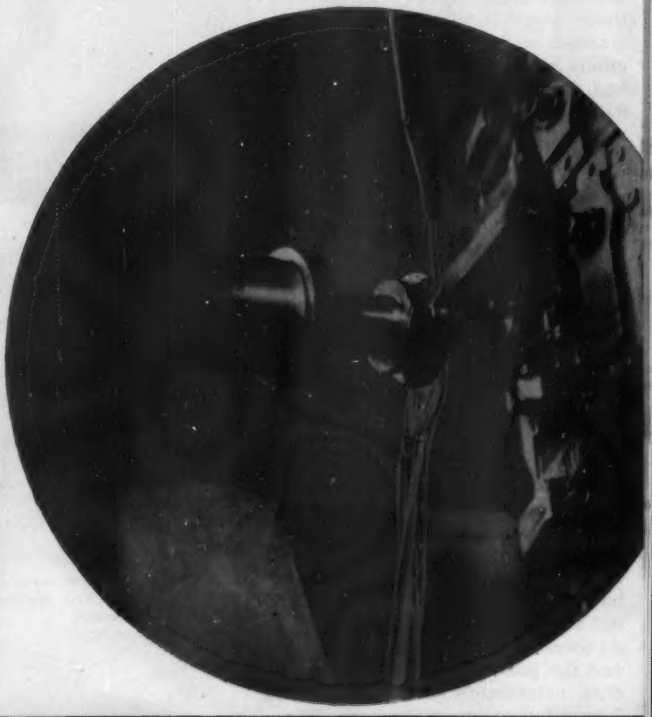
***Kalamazoo* TANK and SILO COMPANY**

1135 HARRISON STREET . . . KALAMAZOO, MICHIGAN

For every cutting operation

one cutting oil - GULF

does the job for precision



on every type of steel

LASUPAR

instrument manufacturer

After careful tests on many brands of cutting fluids, the Belock Instrument Company of Long Island, New York, has found that Gulf Lasupar Cutting Oil gives them better performance over their entire range of machining operations on every type of steel they process.

It helps them produce precision instrument parts to extremely close tolerances, with excellent surface finishes and few tool changes.

Gulf Lasupar Cutting Oil has three degrees of sulphur activity—(1) extremely active sulphur held in a stable solution, (2) sulphur combined with mineral oil by a special Gulf process, and (3) sulphur combined with fatty oil. This combination means that you, like the Belock Company, will get better results on those jobs where finish, cutting speed, or tool life is a problem.

Simplify your cutting fluid storage and handling by ordering the oil that will give excellent results over a wide range of machining operations—Gulf Lasupar Cutting Oil. Contact your nearest Gulf office today for further information.

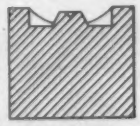
GULF SERVES INDUSTRY

GULF OIL CORPORATION
GULF REFINING COMPANY
1822 Gulf Building, Pittsburgh 30, Pennsylvania

COUNTERBORE
LASTS $3\frac{1}{2}$ TIMES
ESTIMATED
LIFE

...an example of cost reduction through W&S tool design...

A single ⅜"-diameter counterbore designed by Woodruff & Stokes has recently machined its 35-thousandth close-tolerance hole on the round surface of B1113 cold-rolled-steel machine-gun bolts. Under the rigid tool tolerances of ±.0005" and ±10 min., the expected life of these counterbores was 10,000 pieces before sharpening.



A look at the profile of the intricate hole machined by this W&S counterbore is a look at Woodruff & Stokes' specialty—designing and producing small precision tools to do *in a single operation* work often requiring many separate machinings with their attendant loss in accuracy and time.

You can cut production costs by using W&S cutting tools designed to your own product requirements. Investigate—write Woodruff & Stokes Co., Inc., 345 Lincoln Street, Hingham, Mass.

downright disgusting. My wife once told me that if the bridge club consists of a friendly, enjoyable and sociable group of women they are usually lousy card players. If they are good card players, they are lousy company.

When one of the women decides to ride the boss's wife about her husband's gripes the little woman should smile and bid no trump. If this doesn't work, she should throw down a double-shot Manhattan and bid two no trump. After playing the hand and going down 600 points, with this amount of liquor behind her belt, she should have enough fire in her eyes to stare the beefer into changing the subject.

If a foreman hears that a certain employee's wife is making an issue of some gripe of her husband's he should get his wife to invite the couple over to the house to watch the fights and have a couple of beers. If it is a serious or justified gripe, the employee might bring it up. If it was just a passing fancy that he threw at his wife, he will forget about it and the night will be pleasantly spent. One of the unwritten duties of a foreman is to maintain good relations with his men. (I don't know whether a foreman can charge off the expenses of entertaining his employees to promote good relationship on his income tax or not, but it is still one of his responsibilities).

In the good old days, the foreman usually stopped off on pay nights with the boys on the way home from work for a couple of beers. If one of the boys had a gripe, a couple of boiler-makers would either loosen up his tongue and the two of them would have it out, there and then, or he would forget all about it and join in the singing. On Monday morning, a new week would be started and the past would be forgotten. In those days the women were too busy with

"Gesundheit!"

UNIFORM QUALITY
DIVERSE
APPLICATIONS

Each part of every Curtis Universal Joint is made of specially selected steel, individually heat-treated for a specific purpose. This care in manufacture is reflected in our catalog torque and load ratings — which are substantiated by constant testing of production joints.

That's why Curtis Joints are the most dependable, durable and trouble-free available—the standard of the industry.

CURTIS UNIVERSAL JOINTS

- 14 sizes always in stock — bored or unbored hubs
- Fewer parts, simpler construction
- Complete equipment for government tests

PLUS — facilities and engineering skill to handle special specification jobs at any time.

Not sold through distributors. Write direct for free engineering data and price list.

TRADE MARK CURTIS

UNIVERSAL JOINT CO., INC.

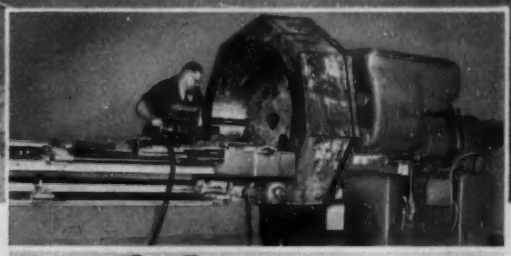
6 BIRNIE AVENUE, SPRINGFIELD, MASS.

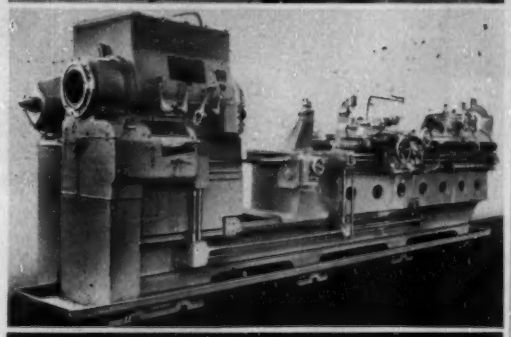
As near to you as your telephone

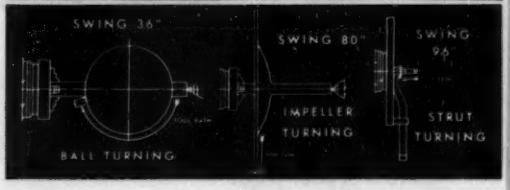
A MANUFACTURER OF
UNIVERSAL JOINTS SINCE 1919

DOUGLAS AD-6 SKYRAIDER

Is the Navy's and Marine Corps' standard attack bomber—used extensively in the Korean War.







15,485 LB. HAMMER DIE MACHINED ON AXELSON 100" GAP BED LATHE

Turning large contour work and odd shapes such as aircraft landing struts are machining problems that are easily handled on Axelson Gap Bed Lathes.

This particular lathe is machining a 15,485 lb. hammer die for forming the cowling for Douglas AD-5 and AD-6 "Skyraiders." The Axelson ball turning attachment permits the I.D. to be finish machined to a template, turn a radius on the bottom, after which the bottom is faced. Note the entire weight of the die is mounted on the spindle without tailstock support.

The machine is powered with a 30 H.P., D.C. motor with electronic control that permits infinite speed changes from 0.4 to 308 R.P.M. Motors up to 75 H.P. may be supplied for heavier work when required.

Similar machines equipped with standard Axelson attachments are finding applications in heavy industry for machining large irregular shaped parts, in the maritime industry for turning turbine rotor blades with integral shafts, and in the oil industry for turning heavy oil well equipment. There is no limit to the application of Axelson Heavy Duty Lathes for they serve all industries.

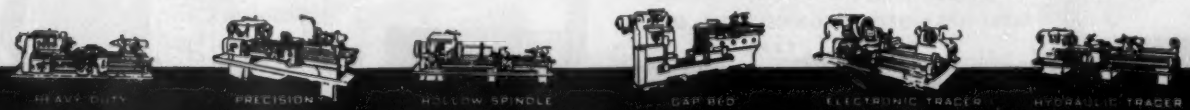
It will pay you to consider Axelson for solving your heavy duty turning problems economically. Call our qualified distributor in your locality or write direct to the factory for recommendations. Your request for assistance is without obligation.

Write for literature describing Axelson Heavy Duty Lathes, Models 16", 20W", 20", 25", 32"; Precision Tool Room Lathe Models 16", 20"; Gap Bed Lathes 25"/100", 25"/125" or Special Machines.

6148 BOYLE AVE., LOS ANGELES 58, CALIF.

MACHINE FACTS

Machine—Axelson 100" Gap Bed Lathe
Swing Over Ways, Gap Closed—34½"
Swing Over Ways, Gap Open—100"
Spindle Bore: 11" Diameter
Spindle Speed Ranger: 0.4 to 308 RPM
Electronic Control provides infinite speed changes
Ball Turning Attachment: 9" to 36" Dia.
Distance Between Centers, Gap Closed: 144"
Distance Between Centers, Gap Open: 216" Max.
Machine Weight: 60,000 Lbs.
Note: For large work motors up to 75 H.P. can be supplied.



AXELSON MANUFACTURING COMPANY DIVISION
PRESSED STEEL CAR COMPANY, INC.
LOS ANGELES 58, CALIFORNIA

PSC

DIRECT FACTORY SERVICE AVAILABLE FROM ST. LOUIS, PHILADELPHIA, KANSAS CITY, BUFFALO, AND LOS ANGELES
AUTHORIZED DISTRIBUTORS IN ALL PRINCIPAL INDUSTRIAL CENTERS

ENDURING ACCURACY

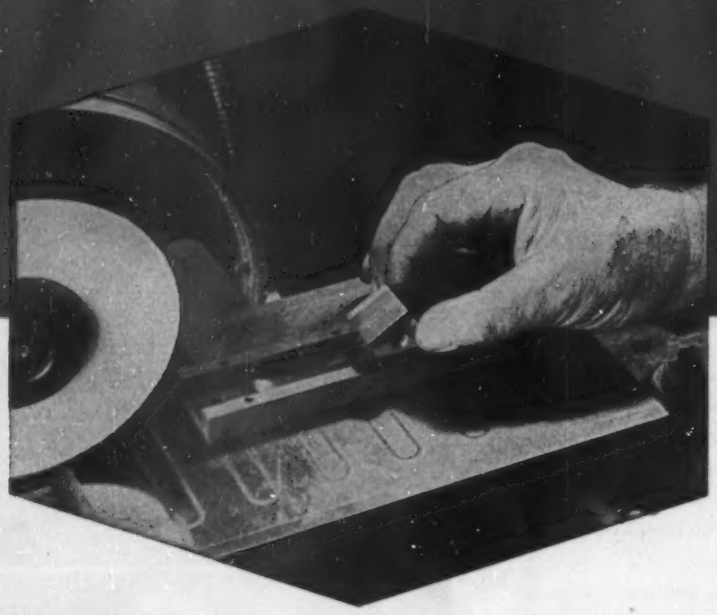
UNDER CONSTANT SHOP USE WITH

PRATT & WHITNEY

SOLID CARBIDE

PRECISION

GAGE BLOCKS



Today's demands for extremely accurate components make high precision measurement ***on-the-job*** an absolute necessity. Gage blocks have moved out into the shop . . . their use is no longer confined to the Standards Room!

To control ***your*** precision measurements . . . to avoid frequent and costly gage block replacements, especially where abrasive conditions prevail . . . RELY ON PRATT & WHITNEY SOLID CARBIDE GAGE BLOCKS. Outwearing steel blocks by many times, they ***are accurate***, they ***stay accurate*** . . . and they ***cost you less*** in the long run. P&W has supplied industry with Solid Carbide Blocks for more than 4 years. Replacements due to wear have been ***negligible*** in this period.

USE THE COUPON ON THE FACING PAGE TO SEND FOR COMPLETE INFORMATION

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

WEST HARTFORD 1, CONNECTICUT, U. S. A.

SINCE 1860

First Choice for Accuracy

MACHINE TOOLS • CUTTING TOOLS • GAGES

the housework, and bringing up the children, to discuss their husbands' gripes at the mill.

Frank J Zarnowski
Rutherford, NJ

MUFF 'N STUFF

Is it better to attempt to track down the operator responsible for a piece of spoiled work, or should a reasonable amount of scrap be overlooked? Will the worker profit by an individual lecture?

SOME OF US ARE SO INTERESTED in the work on which we daily sharpen our noses, that we do not always realize that the shop is often a microcosm. Otherwise, Ed would see the attitude he takes toward the guilty parties is the same that has caused so much trouble in the last few years, namely, "appeasement."

Going back to first principles, the men enter into an implied contract with the company by which they will use their ability and knowledge so many hours a day for so much money. Everybody knows that the best man is not perfect, and will miss once in a while, but this best man is the first to acknowledge his error, resolving within himself not to repeat if at all possible. These men need no appeasement.

Unfortunately, there is a growing number of men who have no interest in the work they are doing and think only of how much they can get out of society without any effort on their part.

These men are the ones who will hide by some means or other their

"And if one of the men asks about a raise, you sort of gasp and say, 'You're joking!'"

defective work, sometimes spending more energy monkeying with records than it would have taken to do good work. If they are brought up short they will resent the bawling out, but they are more or less sour anyway. They will not like the notoriety (even if the bawling out is done in private) and, say what you will, they will be more careful.

If you pass perfunctorily over the defective work, they will either think you don't care (then why should they), or that you are afraid of them, in which case you will go from Munich to Yalta, to Locarno, to Panmunjom, to Geneva.

During the first World War, at one time, I had a number of draftsmen translating French munition drawings into American drawings. It was quite difficult to find men capable of doing the work intelligently—that is, being familiar with both languages and measuring systems and sufficiently mechanically inclined so as not to make too many mistakes. Among these draftsmen was a very good man, a product of a New York patent office. He was good in all respects except for accuracy. Dimensions did not mean anything to him and in particular over-all dimensions did not often agree with the total of individual dimensions. Inspection of his work had to be 100% on this point and we had too few inspectors at best. The first few bawling-outs seemed to do some good; for a few days things went fairly well. But as time went on and pressure of work increased, we had to dispense with his services.

Incidentally, this was a good thing. It obliged us to rearrange the work, hiring girls to trace the design only, (unless otherwise directed) with all dimensions in blank. The experienced draftsmen filled in the figures and the linguists filled in the notations and titles. All-in-all we accomplished more and better work with the same number of people.

P P Fenaux
Lynn, Mass

THE SHOP FOREMAN must be like the Irish reporter: when the fortune teller won the sweepstakes, the reporter sought the happy medium.

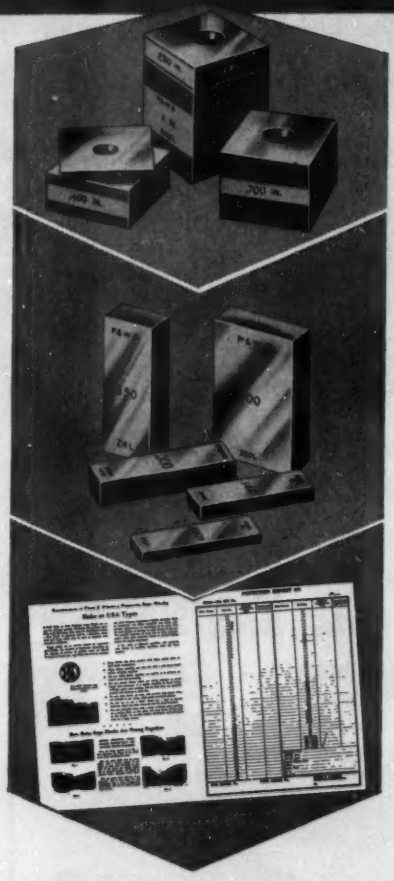
An industrial foreman may be neither vengeful nor irresponsible. He must be an ordinary sort of fellow, know all that is going on in his department, and not get too excited about anything. Each day he and his men spend half their working hours together. It is the foreman's job to make these hours as

For Higher Standards of Precision Measurement...

A COMPLETE

GAGE BLOCK SERVICE

PRATT & WHITNEY



including...

HOKE BLOCKS

Single Blocks or Complete Sets.
Solid Carbide in sizes from .050" to 4".
Steel in sizes from .010" to 20".
Laboratory, Standard or Shop Tolerances.

USA BLOCKS

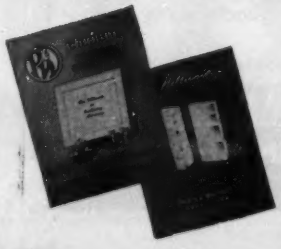
Single Blocks or Complete Sets.
Solid Carbide in sizes from .050" to 4".
Steel in sizes from .050" to 4".
Standard or Shop Tolerances.

RE-INSPECTION SERVICE

To help you *maintain* higher standards of basic measurement, P&W offers a complete re-inspection service for your gage blocks (regardless of make). Blocks are carefully cleaned; burs or bruises are removed; size, flatness and parallelism are critically checked; and a complete certified report as illustrated is submitted.

Whether you're looking for finer, more dependable precision gage blocks; a better, more complete service; or valid recommendations for your specific job requirements . . . you'll find the answers at P&W. Take advantage of Pratt & Whitney's long experience in supplying Industry's gage block needs. Use the coupon below to send for complete information.

First Choice P&W *for Accuracy*



PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
11 Charter Oak Blvd., West Hartford 1, Connecticut
Please send my free copies of Circular No. 532-1 and No. 545 describing P&W Steel and Solid Carbide Gage Blocks.

NAME_____
POSITION_____
COMPANY_____
CO. ADDRESS_____
CITY_____ ZONE_____ STATE_____

MACHINE TOOLS • CUTTING TOOLS • GAGES

"Any guy could chop fast if his Dad made him a hatchet out of Columbia EXTRA Carbon Tool Steel!"

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

TOOL COLUMBIA STEELS

C & J *Geared-Head* LATHES

16 INCH • 12 SPEED

A GENERAL SERVICE TOOL FEATURING HIGH SPINDLE POWER

Accurate—convenient to operate

- Clutch and brake control for spindle
- Exceptionally long carriage bearing — 23¾ in.

Write TODAY for new bulletin 39-A-10.

ONLY ONE MODEL • ONLY ONE SIZE

- Feed provided by separate rod — lead screw is used only for thread chasing

Complete regular equipment includes thread indicator.

CARROLL & JAMIESON MACHINE TOOL CO.

BATAVIA, OHIO

pleasant, as agreeable, as mutually profitable as possible.

Efficiency is closely related to employee morale. Men are happy when their activities are so supervised that they leave the job with a feeling of accomplishment, and are eager to return to it the next day. Vengeance and happiness do not go together.

There is no excuse for vengefulness in dealing with the waste and spoilage problem. A foreman is never justified in snooping, belittling, or injuring the pride of his men. There are other solutions.

A small percentage of scrap is nothing to be ashamed of. Industry is engaged in the production of a high-quality product at low cost on schedule with an ever-increasing efficiency. Mistakes are inevitable in the struggle for perfection.

There are many causes for spoiled work. Instructions to the worker are not always clear. The foreman may be the one really at fault. Some employees develop careless work habits. Those making no effort to improve should be discharged; they jeopardize the job security of their fellow employees.

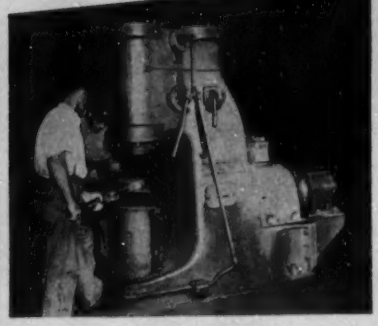
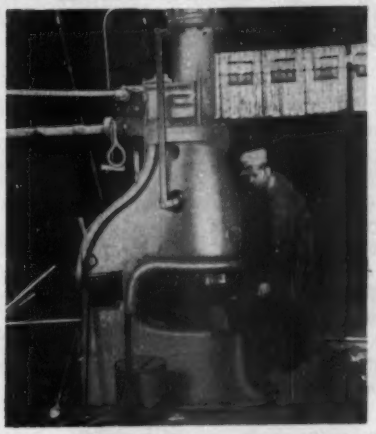
Sometimes work is spoiled when an operator tries to improve on a planned method. The foreman advises such an operator that there is no aversion to improvement. However, when such an attempt is made, the foreman wants to be around to offer his advice and experience.

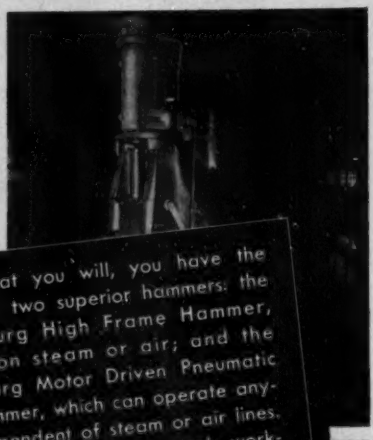
Spoilage occurs when a worker is not concentrating. He may be worried about conditions at home. He may not be getting along with his fellow workers. He may think that the foreman has a grudge against him. In such cases the foreman makes an effort to put the worker's mind at ease.

The foreman must make a determined effort to discover the real cause for all waste and spoilage.

"—Oh, oh, here comes you-know-who with more of his kid's math homework."

For Flat Die Forging, Blacksmithing, or Tool Dressing



CALL it what you will, you have the choice of two superior hammers: the Chambersburg High Frame Hammer, operating on steam or air; and the Chambersburg Motor Driven Pneumatic Forging Hammer, which can operate anywhere, independent of steam or air lines. The High Frame Hammer has ample working space, adaptable to the forging of large discs and rings, the upsetting of high stems, etc., and has many other outstanding features. The Pneumatic Forging Hammer is completely self-contained, with its motor driven compressor built-in. It is capable of greater forging output than any other hammer of its type.

Either or both hammers, whether it be a 150 lb., a 600 lb. or a giant 6000 lb., will represent a profitable investment for your flat die, blacksmithing or tool dressing needs. Write today for Bulletins 1-L-9 and 16-L-9.

CHAMBERSBURG ENGINEERING COMPANY • CHAMBERSBURG, PENNA.

CHAMBERSBURG
THE HAMMER BUILDERS

Builders of THE IMPACTER
"FORGING IN MID-AIR"

Bay State Taps produce threads of the utmost precision with a maximum of productivity. This dual quality of Bay State Taps ... *precision performance* ... is readily available from nearby shelves of industrial supply distributors.

BAY STATE TAPS

BAY STATE TAP & DIE COMPANY MANSFIELD, MASS.

Such efforts are seldom necessary in a well-supervised department. Workers should be so handled that they will come to the foreman as soon as they run into trouble.

A foreman can best solve the waste and spoilage problem as he should solve all of his problems—by developing his leadership qualities. This leaves no room for vengefulness.

Peter A Seward
Swampscott, Mass

DUCKIN' THE BUCK

Can a foreman escape the responsibility of dealing with wage increase requests? Will the men be satisfied with the personnel department handling the raises rather than the foreman who is familiar with their work?

OUR CIVILIZATION, our society, our nation, is held together by an intangible thread—our willingness to accept responsibility.

We are a great nation because so many of us do accept our social, our moral, and our civic responsibilities. The free enterprise system is an economic success because responsibility is delegated, and rewarded, in accord with accomplishment.

Under the American way of life an industrial corporation is granted the privilege of making a profit. Many responsibilities go with this privilege. One is to survive by operating at a profit; another is to give the worker a fair day's pay for a fair day's work.

Foremen are part of the management of a corporation. They are that part of management best situated to appreciate the efforts of the worker. It is their responsibility to see to it that the worker receives just compensation within the range of his job classification.

"Gosh, Joe — drop us a card sometime and let us know how you like it at the other end.

DOW CORNING CORPORATION

Silicone News

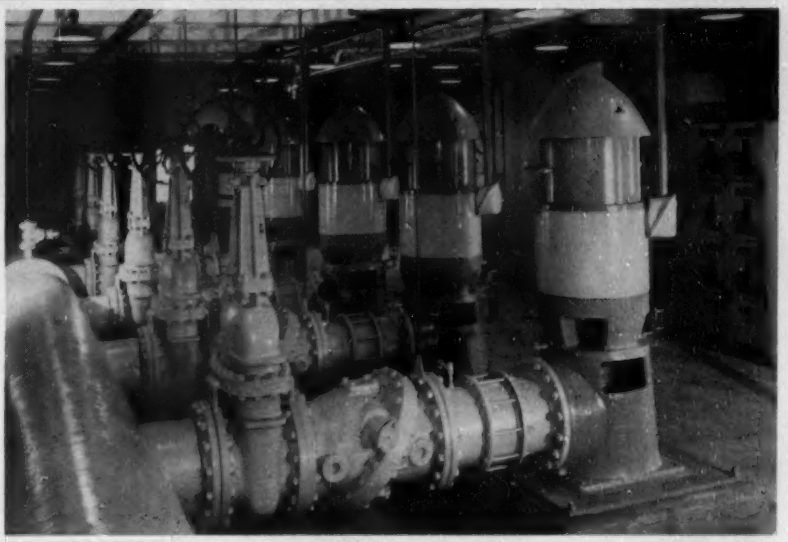
PRODUCTION & MAINTENANCE EDITION No. 3

SILICONE FLUID SAVES MONEY IN HIGH TEMPERATURE BATHS

Used for accelerated life testing at temperatures ranging from 300 to 400 F in the Metallurgical Laboratories of The Dow Chemical Company, 5-gallon baths of Dow Corning 710 Silicone Fluid have been held at operating temperature constantly since June, 1951.

To fill one of these baths with hydrocarbon oil used to cost $3.60 compared to $240.00 for the silicone fluid. But the organic oil fumed, smelled, carbonized, presented a fire hazard, and had to be completely changed at least once a month at a labor cost of about $7.00. To keep one bath going one year cost at least $125.00 or over half the price of the silicone fluid.

The 710 Fluid is still clear and unchanged after more than 3 years of service. Use of this odorless silicone fluid has already saved $140.00 and eliminated a fire hazard. **No. 23**



SILICONE INSULATION BOOSTS OUTPUT OF WORLD'S LARGEST SILICONE PLANT

To keep up with a market that was doubled, redoubled and doubled again during our first eight years, we have had to make maximum use of existing equipment. Part of that increased capacity has come from the use of silicone (Class H) insulation to uprate electric motors.

Our first installation was made in 1947, when our cooling water pumps fell short of required capacity by some 1300 gallons per minute. Rewinding the 30 hp and 50 hp motors with Class H gave us more capacity. New pumps and motors would have cost $4,000 with delivery at that time 18 months away. Rewinding cost $1100.

Those motors have been delivering 45 and 75 hp respectively, 7 days a week, 24 hours a day ever since. Two years ago, an unexpected increase in current over a weekend of low voltage generated so much heat that the aluminum retaining ring studs melted. We found, however, on disassembling the motors that the silicone insulation was still in good condition.

That performance was remembered when our new 15,000 GPM cooling water spray pond was built. The pump motors, three 100 hp and three 200 hp vertical hollow shaft units, were insulated with our own silicone (Class H) insulation. They are fed through a 1000 KVA dry-type sealed Class H transformer, which effectively eliminates fire hazards, transformer oil maintenance, and long secondary runs of copper. *(continued pg. 2)*

Silicone Greases Reduce Maintenance Costs

Dow Corning 41 Cuts Bearing Failure In Fabric Drier Operating at 295 F

In processing rayon fabric, the Lee Tire and Rubber Company of Conshohocken, Penn. uses a 95 foot dipper and drier. The drying side of the unit operates at 295 F, 24 hours a day, 5 days a week. It contains some 288 ball and roller bearings ranging in size from 1 3/16" to 2 11/16" and in speed from 10 to 100 rpm.

Until mid-1953 the bearings were lubricated with an organic grease through a shot feed system. In theory, bearing life should have ranged from 3 to 9 months depending on location. In practice bearings were replaced almost daily. At 295 F, the grease oxidized, stiffened and caked. *(continued pg. 2)*

Dow Corning 44 Improves Performance of Distributors in Fleet Automobiles

Originally developed for ball bearings operating at temperatures ranging from —40 to 350 F, Dow Corning 44 Silicone Grease is proving to be an excellent lubricant in a variety of applications. Lee Engineering Company of Milwaukee, for example, lubricates the distributors of their company cars with this heat stable grease.

Lee maintenance men noticed that newly installed contacts invariably required gap adjustment after 400 to 500 miles. Occasionally, the gap would close tightly enough to prevent engine starting. They found the difficulty resulted from thinning of the organic grease used in the distributors. *(continued pg. 2)*

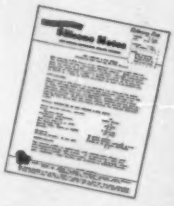
FOR DATA RELATING TO THESE ARTICLES, CIRCLE REFERENCE NUMBER IN COUPON ON NEXT PAGE

MORE

DOW CORNING CORPORATION

Silicone News

DOW CORNING PUBLICATIONS ON NEW DEVELOPMENTS AND TECHNICAL DATA . . . .



A reprint from Precision Metal Molding Magazine describes various applications of silicone die lubricants in metal fabricating. Article includes information of effectiveness, concentrations used and methods of application. *No. 28*

∇

Silicone based water repellent finishes for above-grade masonry walls repell water and water borne stains; virtually eliminate efflorescence and spalling without plugging the pores or changing the color or texture of masonry surfaces. Easy and inexpensive to apply, such silicone treatments remain effective for years. Over 60 formulators of masonry water repellents made with Dow Corning silicones, are listed in our current "Sources of Supply." *No. 29*

∇

In "Uprating Horsepower with Silicone Insulation," a recently published article, the performance characteristics and the factors that must be considered in uprating motors by rewinding with silicone (Class H) insulation are summarized. Several case histories describe how industrial motors have been successfully uprated to deliver 50 to 75% more horsepower. *No. 30*

∇

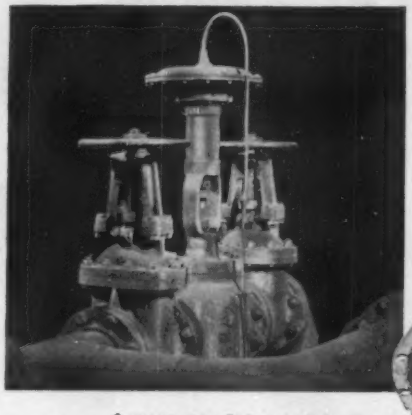
Motor Repair Shops, featuring Class H insulation made with Dow Corning silicones, are conveniently located in or near most industrial centers. Write for copy of recently revised listing which includes more than 200 such repair shops in 35 states. *No. 31*

∇

New 8 page brochure presents factual evidence that Dow Corning 41 Silicone Grease cuts relubrication schedules and replacement costs in a wide variety of high temperature, low speed applications. Includes several illustrated and documented case histories describing effectiveness of 41 Grease in oven conveyor bearings, dolly wheels, injection valves and turbine governors. *No. 32*

∇

Durable protective coatings made with silicone vehicles include white and colored enamels that withstand temperatures up to 700 F; aluminum pigmented finishes which minimize maintenance of exhaust stacks exposed to corrosive atmospheres and temperatures up to 1000 F; and modified silicone-organic paints that offer greater resistance to temperature extremes, weathering, oils and greases. New source of supply list names more than 60 formulators and suppliers of such protective finishes. *No. 33*



As a Valve Diaphragm, SILASTIC® Outlasts Organic Rubber 7 to 1 at 100 F

® TRADE-MARK REG. U.S. PAT. OFF.

The diaphragm in this valve that regulates the intake to a boiler feedwater storage tank, is in almost constant motion 24 hours a day at temperatures well above 100 F. Successive synthetic rubber diaphragms lasted 7, 11 and 13 months respectively.

That's unsatisfactory performance in a power house supplying energy to a large chemical plant. So they tried a Silastic coated glass diaphragm. Recently inspected after more than 78 months of service, the Silastic diaphragm was still soft and flexible; showed little wear; appeared serviceable for many more months.

And that's no more than you would expect of a rubber that shows relatively little change in physical properties after aging for 12 months in an air circulating oven at 350 F. After such accelerated aging, typical samples molded from the same Silastic stock showed an increase in hardness of only 18 points, from 46 to 64 durometer; elongation went down from 320 to 105%; tensile strength dropped less than 5%; and there were no significant changes in their dielectric properties. *No. 25*

DOW CORNING 41 *(continued)*

About 18 months ago every bearing was cleaned and relubricated with Dow Corning 41 Silicone Grease. In the first month, savings on replacement parts and maintenance costs alone paid for the change-over. Since then, a weekly inspection and monthly relubrication with Dow Corning 41 has almost completely eliminated bearing failure. *No. 26*

DOW CORNING 44 *(continued)*

Having previously noted the long life of silicone grease in precision gearmotors, Lee applied Dow Corning 44 to the distributors of a few fleet automobiles. That was over a year ago. No adjustments have been necessary except those due to normal point wear. No deterioration has been observed in the original application after as many as 5000 miles of service. *No. 27*

CLASS H BOOSTS OUTPUT *(continued)*

When the capacity of our powerhouse was doubled recently, a 750 KVA sealed dry-type Class H transformer was installed to supply the 440-v motor load required to operate the new boiler and water softener. Other silicone insulated motors in and around the powerhouse include a new 125 hp feedwater pump motor, three 5 hp (rewound to deliver 7½) feedwater forwarding pump motors, and four 5 hp drive motors on the cooling tower fans. On the latter, Class H is not used for uprating, but to prevent failure due to moisture backwash from the tower itself.

From this brief progress report it's apparent that we, like thousands of other companies, are making full use of silicone (Class H) insulation to cut our production and maintenance costs and to make more efficient use of power. *No. 24*

Dow Corning Corporation, Dept. ERI-23, Midland, Michigan

Please send me: 23 24 25 26 27 28 29 30 31 32 33

NAME _____

TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE____ STATE _____

SILICONE NEWS is edited for production and maintenance men by

DOW CORNING MIDLAND

first in silicones

DOW CORNING SILICONES

CORPORATION MICHIGAN

ATLANTA CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D.C. (SILVER SPRING, MD.)

CANADA: DOW CORNING SILICONES LTD., TORONTO ENGLAND: MIDLAND SILICONES LTD., LONDON FRANCE: ST. GOBAIN, PARIS

Foremen are paid well to be leaders and to accept responsibility. Periodic surveys are made of a foreman's job. One who passes the buck, or refuses to accept responsibility, or fails to exercise leadership, is "promoted" to another position. Since a foreman is instructed to give the worker the benefit of any reasonable doubt, there is no excuse for "duckin' the buck," especially on a pay raise.

Immediate attention to an employee's demands, be they justified or not, is conducive to morale. High morale is essential to bring out the utmost of capacity residing in the working forces of an enterprise. Under our economic system enterprise means competition. Fortunately the American industrial worker thrives on competition. He freely accepts the responsibility of proving himself worthy of any group to which he belongs. Such a man is entitled to the kind of foreman he wants to work for. Top management tries to satisfy the worker.

The industrial worker wants a leader who will fight for him when he is right, who will tell him off when he is wrong, who has the authority to promote him or demote him, as he knows he deserves. The industrial worker wants to be recognized. He wants his work to be important. He wants his foreman to be important.

The foreman is the "Company" as far as the worker is concerned. The foreman knows the worker best. The foreman can serve the worker best. The responsibility for knowing the worker, and serving him, has been delegated to the foreman. No foreman worthy of the name should duck this responsibility. Every time a foreman passes the buck, or ducks it entirely, he weakens the prestige of management. He lowers morale in the shop. He injures the competitive position of his company.

Mr Foreman, don't pass the buck. Don't duck responsibility. Be the leader of your men.

Peter A Seward
Swampscott, Mass

AL IS SADLY MISTAKEN if he thinks he got rid of a headache by asking the Personnel Department to handle all raises. This responsibility is the foreman's by tradition, precedent, and position, and cannot be transferred by writing out a memo, or working rules, as Al calls them. The foreman is in a position where he can observe the men and see just what they can do and how much effort and care they put into their work.

Magna-Lock
ELECTRO-MAGNETIC
CHUCKS HOLD

22% MORE HOLDING ----------AREA

Fine poles permit holding small work pieces, too.

This extra margin of holding power holds an extra margin of profit for you!

Get details, DEPT. AM-114

Request Magna-Lock as original equipment on your new machines

Hanchett MAGNA-LOCK CORPORATION
Magnetic Chucks and Devices
BIG RAPIDS, MICHIGAN, U. S. A.

New Design Motor Gives SKIL DISC

SKIL 7" Disc Sander
Model 851, Standard Duty

A completely new SKIL Disc Sander. Produces smoother, faster results with greater ease, at less cost than ever before possible. Far more power; scientific design for lighter, easier handling; dust-tight trigger switch; larger inspection plate. Ball bearings throughout.

30% More Power to...

SANDER MODEL 852

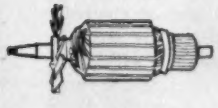
Speed increased to 5,000 r.p.m. for Greater Performance on the Job!

*Powerful...fast...light...*and *safe!* That's the new, improved SKIL Model 852 Heavy Duty Disc Sander. With 30% more power for increased r.p.m. to 5,000, this perfectly-balanced sander assures you *highest maintained working speed* on all jobs.

New front handle location makes more efficient use of tool weight. Shorter length and *lighter* weight lessen operator fatigue throughout day-long use. The new SKIL Model 852 is practical, dependable . . . giving peak performance at maximum safety.

No matter what your product, nor what phase of its production is involved . . . if the problem concerns grinding, polishing, sanding, or finishing—"SKIL is the Answer"!

These Big Features Make SKIL Your Best Buy in Disc Sanders!



IMPROVED MOTOR!
Radically changed to give 30% more power! Maintains high load speed... yet runs cooler!

PRECISION-CUT GEARS!
Spiral bevel gears cushioned in synthetic rubber. For longer-lasting, smoother operation!

FRONT HANDLE!
Scientifically positioned for better balance and control. For right or left hand use.

TOOL REST!
A SKIL extra for added convenience. Protects work when sander is laid down.

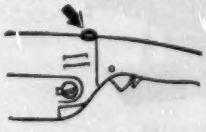
CORD PROTECTOR!
Extra-long rubber protector keeps heavy duty cord away from work area for greater safety.

REAR HANDLE!
Scientifically contoured to fit the hand. More comfortable to use and carry to the job.

TRIGGER SWITCH!
For greater comfort in use; with continuous operation button. Dustproof, 2-pole design for long life.

INSPECTION PLATE!
Extra large, easy to remove, for complete inspection and cleaning of brushes, commutator.

SPINDLE LOCK!
Conveniently located at front of tool housing. Makes accessory changes far easier.



WEAR STUD!
Stud of durable, hardened steel protects tool from damage to rear housing.

FREE! Let Your SKIL Distributor Show You in a Convincing Demonstration and FREE Trial ... that "SKIL is the Answer" to Your Metal Finishing Bottlenecks!

SKIL
PORTABLE TOOLS

Made only by SKIL Corporation
formerly SKILSAW, Inc.
5033 Elston Avenue, Chicago 30, Illinois
3601 Dundas Street West, Toronto 9, Ontario
Factory Branches in All Leading Cities

Mail this Coupon—NOW!

SKIL Corporation, Dept. AM-114
5033 Elston Avenue, Chicago 30, Illinois

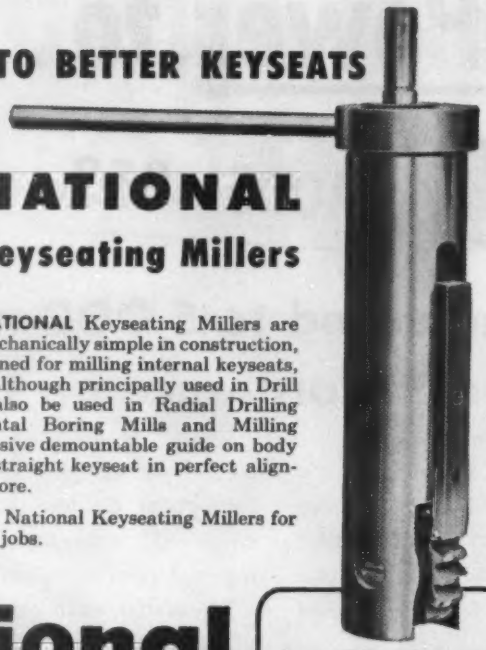
☐ I would like a SKIL demonstration and free trial
☐ Please send me literature on SKIL Sanders and Grinders

Name_____

Address_____

City_____ Zone_____ State_____

THE KEY TO BETTER KEYSEATS



NATIONAL
Keyseating Millers

NATIONAL Keyseating Millers are mechanically simple in construction, sturdily built, designed for milling internal keyseats, faster and better. Although principally used in Drill Presses they can also be used in Radial Drilling Machines, Horizontal Boring Mills and Milling Machines. An exclusive demountable guide on body of Miller assures a straight keyseat in perfect alignment with axis of bore.

You can depend on National Keyseating Millers for all your keyseating jobs.

national
MACHINE TOOL CO.
CINCINNATI 22, OHIO

WRITE TODAY
for Catalog No. 17
complete, handy size

You'll Get
BETTER RESULTS
From Your RUTHMAN GUSHER COOLANT PUMP

ILLUSTRATED IS A WESTERN No. 3-12 UPRIGHT DRILL EQUIPPED WITH A GUSHER COOLANT PUMP. MODEL 3-P3.

because RUTHMAN makes a better pump

Don't take our word for it. We'll be glad to show you our long list of satisfied users, machine tool manufacturers that have used Gusher Coolant Pumps as standard equipment on their machines for *ten, twenty, thirty years.* Honestly, it reads like a blue book of the leading machine tool manufacturers. *Follow the leaders.* Specify Ruthman Gusher Coolant Pumps for all your metal cutting machinery.

THE RUTHMAN MACHINERY CO.
1818 READING ROAD CINCINNATI, OHIO

Responsibility is just one of those things which cannot be transferred. When the company is short of cash the owners cannot tell the creditors that the controller or treasurer is responsible for these matters. The hostess cannot excuse herself for a burned roast by telling her guests that the cook is responsible. It is the responsibility of the hostess to hire the cook, and therefore the hostess is directly responsible for the work of the cook. This responsibility is an inherent one and cannot be transferred by making a new rule or writing a memo.

The men in the shop work for their present pay and for their future advancement. The value of an individual employee to the organization is a function of his knowledge and skill, and his ability to apply them, as well as his ambition and aptitude. If the Personnel Department handles raises what will happen to the man's interest in his job—what will be his incentive to turn out good work in good time?

Al may think he is making things easier for himself by turning his back on this very important phase of his work, but I am sure he is going to regret it. He will realize this as soon as Personnel starts getting requests for raises. The Personnel Department is sure to start asking him about the men who are requesting raises. After all, they do not know what kind of work the man has been turning out, or his attitude toward his work. The men will know that Personnel is contacting the foreman for this information and they will be after Al to put a good word in for them. Instead of getting rid of part of his job, Al will find himself on one corner of a triangle, with the Personnel Department on the second corner, and the men on the third corner. He will wind up with more trouble than he had before.

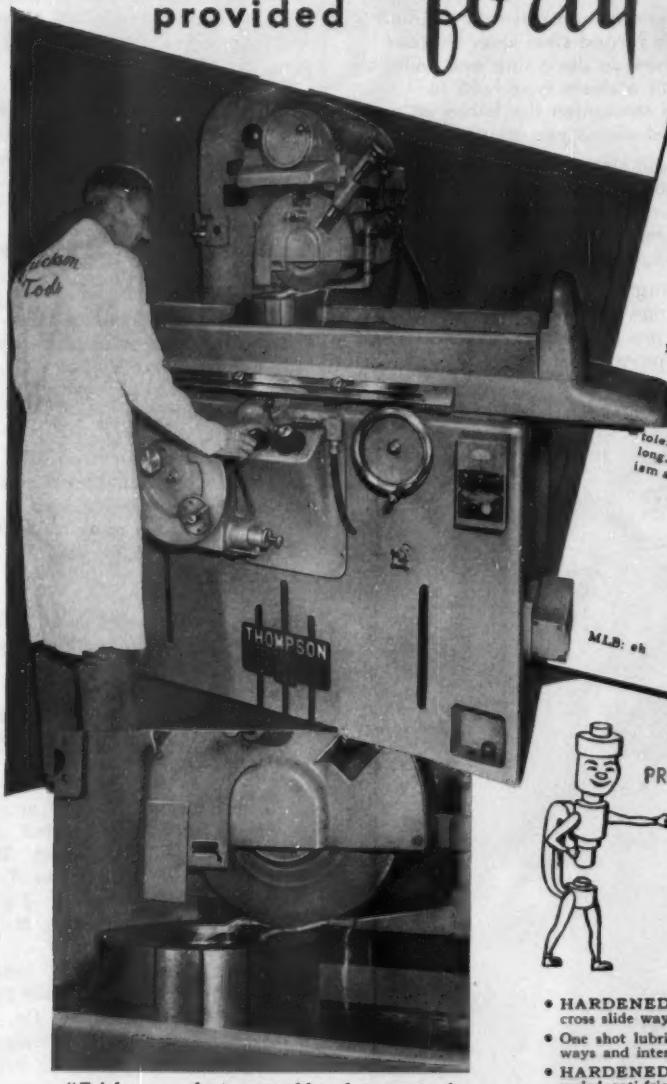
"He's one of the hardest men in the business to get to."

The Erickson Tool Company

asked for at least .0001 for parallelism and size. . .

The Thompson 2F (8x10x24) Super Precision Grinder

provided "forty millionths"



ERICKSON TOOL COMPANY
EAST 83RD AND HAMILTON AVENUE
CLEVELAND 14, OHIO

September 17, 1954

The Thompson Grinder Company
Springfield, Ohio

Attention: Mr. John Wilson,
Vice President.

Gentlemen:

May we take this opportunity to express our satisfaction with your Thompson 2F 8 x 10 x 24 Surface Grinder.

We purchased this grinder on your claim of .0001 for parallelism size. This tolerance is necessary for most of our work.

Upon its arrival we asked a service man to prove this .0001 tolerance, using 5 blocks on a surface of 4 inches wide by 20 inches long. The test blocks showed .00004 (forty millionths) for parallelism and size. This was well within your guarantee.

Yours truly,

ERICKSON TOOL COMPANY

M. L. Benjamin,
President.

M.L.B: eh

PRECISION PETE says:

"You may be surprised to find that Thompson 2F Grinders cost less than some others and still provide all these features for greater accuracy and longer service. Fast delivery, too!"

"Erickson products are sold and guaranteed to hold extreme accuracy. It is vital that we have the precision equipment necessary to manufacture these products. Our Thompson 2F Grinder delivers this precision. In the above picture we are grinding a #1200 expanding sleeve and hold within .0001 parallelism and size."

- **HARDENED AND GROUND** cross slide ways completely sealed.
- One shot lubrication to cross slide ways and internal saddle bearings.
- **HARDENED AND GROUND** sealed anti-friction vertical slide.
- **HARDENED AND GROUND BED WAYS** with automatic lubrication.
- 3600/1800 R.P.M. 2 speed wheel head. Heavy alloy steel spindle heat treated, runs in super precision ball bearings accurately preloaded, lifetime lubricated.
- Handy control panel.
- Elevation micrometer stop graduated in .0001"
- **GROUND THREAD FEED SCREW.**
- Automatic wheel **TRUING** device.
- Longitudinal hand feed with automatic engagement.
- Hydraulic head movement throttle with rapid traverse.
- Hydraulic table movement throttle.
- Elevating hand wheel graduated in .0005".

Call, write or wire for estimate

Thompson Grinders

THE THOMPSON GRINDER COMPANY • SPRINGFIELD, OHIO

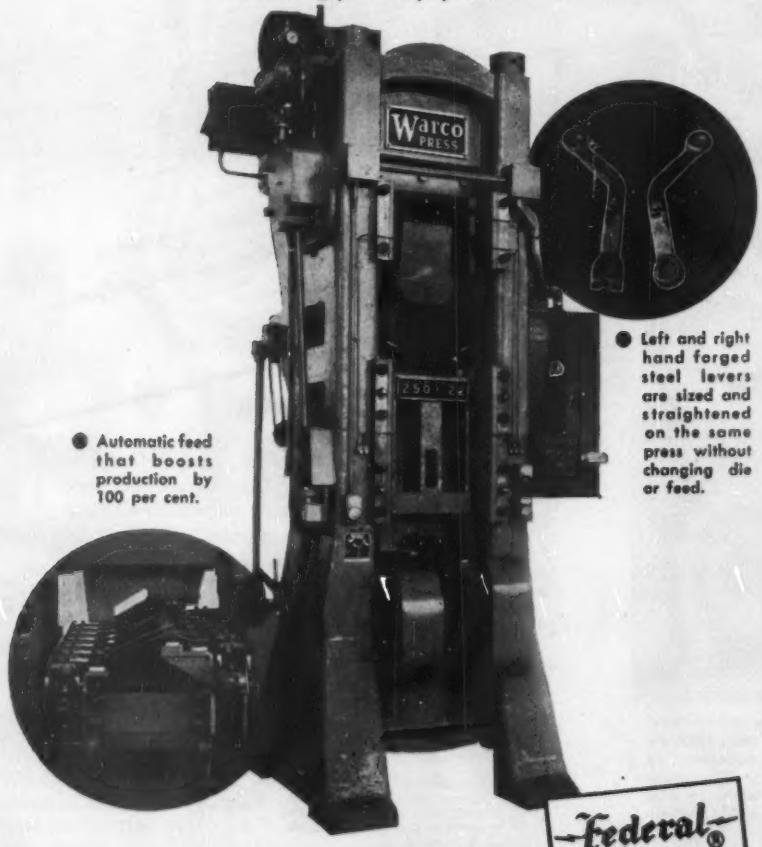
"Automated" Warco

Coining Press Slashes Sizing and Straightening Costs for Leading Automobile Builder

When a leading automobile manufacturer wanted to cut production costs on a forged steel lever Warco engineers worked with them in designing and building a 250-ton coining press with a chain type feed to automatically size and straighten the levers at a speed of 30 finished pieces per minute.

Front loaded, the press will size and straighten either left or right hand lever without change in dies or feed. It has reduced the production time of this part by more than one-half and has provided a safer, less fatiguing job for the operator.

Warco is constantly working out faster, less expensive and safer press production methods. Why not call them in the next time you are in the market for cost-cutting press equipment?



● Automatic feed that boosts production by 100 per cent.

● Left and right hand forged steel levers are sized and straightened on the same press without changing die or feed.

Federal WELDERS

THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO

Warco PRESSES

Distributors and Representatives

Edgcomb Steel Corp, Hillside, NJ, distributor of steels and aluminum. has changed its name to **Edgcomb Steel & Aluminum Corp.** Change is in line with growth in aluminum sales since material was added to its line in 1947.

Elwell-Parker Electric Co, Cleveland manufacturer of industrial trucks, has appointed **Landes, Zachary & Peterson Co** as distributor to cover the states of Colorado, Wyoming, Utah, and New Mexico. Firm headquarters is located at 2500 Seventh Ave, Denver, Colo.

Robert Lee Weidman has been named technical sales representative for **Cooper Alloy Foundry Co,** Hillside, NJ; he will cover the Mid-Atlantic states.

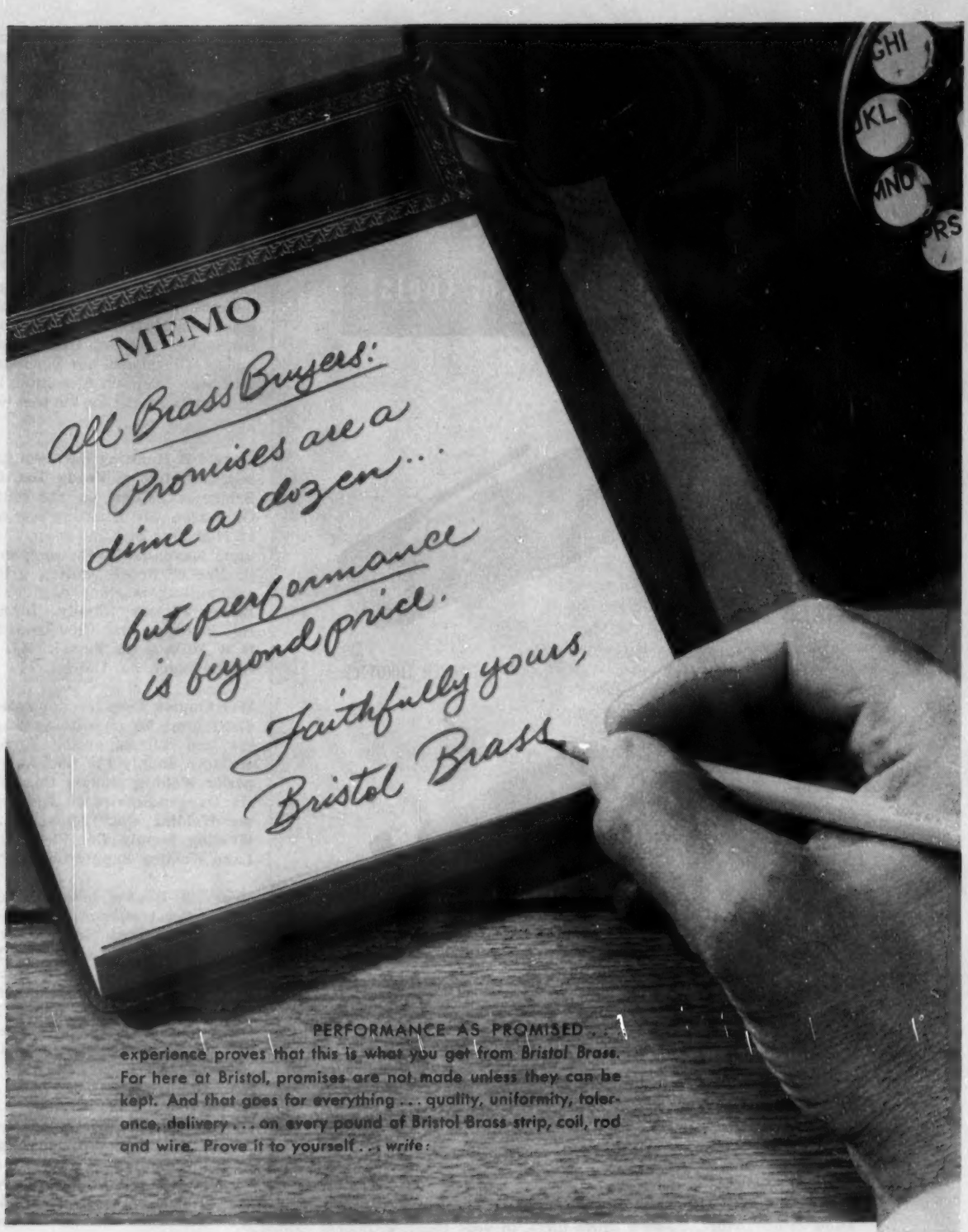
Virgil Fortner, industrial sales executive, has been appointed representative in the Chicago area for the **Gorham Tool Co** of Detroit. His offices are located at 5125 W North Avenue.

Petley Incorporated has been appointed by **Republic Steel Corp** to handle sale and distribution of materials handling equipment in California, Arizona, and Nevada. Petley maintains offices in Los Angeles, Oakland, and Fresno, Calif.

Arthur Sansom has been appointed to the sales engineering staff of **E W Bliss Co's Can Machinery Div** in New York. He was previously New York representative for Fairchild Aircraft Div, Hagerstown, Md.

William R Rudolph has been appointed an abrasive engineer for **Bay State Abrasive Products Co,** Westboro, Mass. He has been assigned to the Missouri, Kansas, and southern Illinois area, with headquarters at the company's Chicago branch office and warehouse. Mr Rudolph was formerly president of the Robert Rudolph Tool Co in St Louis.

John C Geary has been appointed special sales representative, stainless division, for **Crucible Steel Co of America.** Mr Geary has been assigned to the New England territory with headquarters in New Haven, Conn.



PERFORMANCE AS PROMISED . . . experience proves that this is what you get from Bristol Brass. For here at Bristol, promises are not made unless they can be kept. And that goes for everything . . . quality, uniformity, tolerance, delivery . . . on every pound of Bristol Brass strip, coil, rod and wire. Prove it to yourself . . . write:

THE BRISTOL BRASS CORPORATION

has been making Brass strip, rod and wire here in Bristol, Connecticut since 1850, and has offices and warehouses in Boston, Chicago, Cleveland, Detroit, Milwaukee, New York, Philadelphia, Providence, Rochester. The Bristol Brass Corporation of California, 1217 East 6th St., Los Angeles 21. The Bristol Brass Corp. of Ohio, 1607 Broadway, Dayton.

"Bristol-Fashion" means **Brass at its Best**

Keep your eye on Buckeye

for everything new
in air and electric power tools!

HEAVY DUTY
90° ANGLE HEAD
DRILLS

LEVER THROTTLE

LOCK BUTTON THROTTLE

For HEAVY-DUTY applications—designed for minimum maintenance, built for maximum service. Compact, lightweight, lowest overall head height—for ease of handling, even in the tight spots.

No exposed moving parts to create a hazard for tool operator or damage to the work piece. All working parts, including bevel gears, bearings and spindle, are separate units, easily and economically replaced—individually—when worn. Available with 1/4"-28 or 5/16"-24 thread; also with 1/4" capacity chuck.

Those are the facts about the NEW Buckeye 90° HEAVY-DUTY Angle Head Drills . . . we'll prove them, in your plant, without obligation. Just tell us where and when, we'll do the rest!

Buckeye Tools
CORPORATION
DIVISION 15 • DAYTON 1, OHIO

producers of
the world's first
successful
rotary air tools

Don R Manecke has been named sales representative for Wisconsin by **Adamas Carbide Corp,** Kenilworth, NJ. Mr Manecke is located at 739 North Broadway, Milwaukee. **Pierce Frauenheim,** 4920 Penn Ave, Pittsburgh, will cover western Pennsylvania; **R C Dombrow Co,** Chicago, has been assigned northern Illinois and northern Indiana.

M R Tenenbaum has been named to represent **Lester-Phoenix, Inc,** Cleveland, in sales and service of die-casting and injection molding machines. Mr Tenenbaum, who will cover the Michigan area, operating out of Cleveland, has been associated with Monarch Aluminum Co as chief metallurgist for the past eleven years.

Donald B Huntting has been named representative of **Ready Tool Co** of Bridgeport, Conn, in the southern Ohio area. Mr Huntting has offices at 7446 Vine St, Cincinnati. Distributors appointed by the company for its line of Red-E centers, grinding and milling machine dogs include: **Bauer Factory Supply,** Irvington, NJ; **Bearings, Inc,** Cleveland, Ohio; **H W Mills & Co, Passaic, NJ; Chas A Strelinger Co,** Detroit.

Worthington Corp has appointed six distributors for its welding positioners and turning rolls: **Louisiana Welding Supply Co,** Louisiana; **Superior Welding Supply Co,** Wisconsin; **Oxygen Service Co,** and **Tennessee Welding Co,** Tennessee; **Jones Welding Supply Co,** Virginia; and **Lake Welding Supply Co,** Michigan.

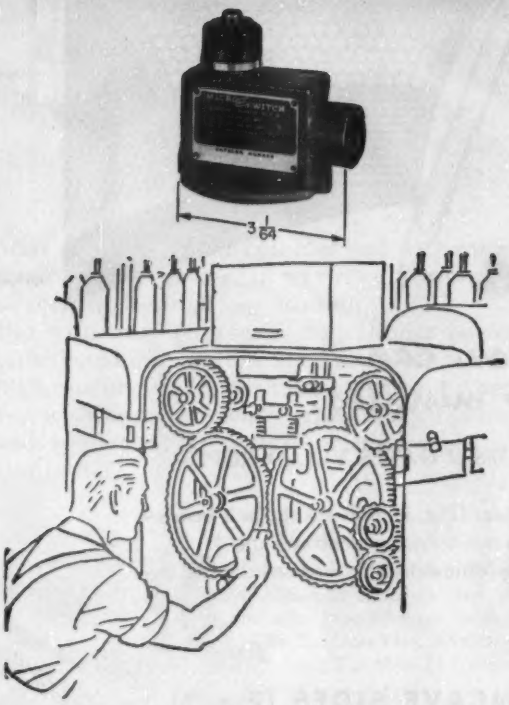
Henry A Bourne has been named Pacific Coast sales manager for **Republic Steel Corp.** He succeeds **Harvey A Craig,** transferred to Cleveland to head up the Bolt & Nut sales division. Mr Bourne was formerly district sales manager of the Tulsa, Okla, office. **Curtis C Snyder,** assistant district sales manager at Los Angeles, has been appointed sales manager there

Rudolf Torbico has joined **General Electric Co's Carboloy Dept** as a field sales representative. He was formerly associated with Moore-Wright Co, Port Huron, Mich, and previously with Ford and General Motors.

Andrew J Kemp has been appointed manager of **A M Castle & Co's** Baltimore plant; **Edward Schalk,** former manager, has been transferred to Chicago. Mr Kemp joined the steel distributing firm in 1934; he has been stationed in the Kansas City office for the past seven years.

MICRO SWITCH Precision Switches
A PRINCIPLE OF GOOD DESIGN

Mills find profits in MICRO SWITCH protection for men and machines



THREAD BREAKAGE on a knitting machine can be expensive. Unless the machine is stopped at once it can mean breakage of costly needle beds.

R. E. Miller, plant superintendent of the E-Z Mills at Carterville, Ga., figures two of these MICRO SWITCH precision switches are saving him $50 a year per knitting machine. He installs them to replace stop motions and mechanical stops that often failed when thread breakage occurred.

Like Mr. Miller, hundreds of plant operators are saving important money by the use of these MICRO SWITCH products to make equipment more automatic, safer and more productive.

Purchase these switches from the MICRO SWITCH distributor in your town. For technical information contact the field engineer at your nearest MICRO SWITCH branch office.

PLUGGING of danger sources—both for operators and machines—with MICRO SWITCH precision switches is common practice of progressive plant operators.

This employee can't get his fingers caught in the gears. The MICRO SWITCH precision switch turns off the power when he opens the door.

But safety is only one way MICRO SWITCH products contribute to more production from present machinery. Used as limits and interlocks, they make all kinds of machines more automatic and efficient. Stocks of switches are available at the MICRO SWITCH distributor near you. Look in the yellow pages of your phone book.

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches and mercury switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

MICRO SWITCH
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
FREEPORT, ILLINOIS

This simple idea saves money in V-Belt Costs

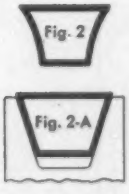
You can prove it in two minutes!

To prove how the CONCAVE SIDES of GATES VULCO ROPES *save money*, just make this simple test—

Bend *any* V-Belt that has *straight sides* (Fig. 1) and—as the belt bends—*feel* the sides *bulge out* (Fig. 1-A). This out-bulge concentrates the wear at the points shown by arrows—and this naturally shortens the life of a *straight-sided* belt!

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

(U. S. PAT. 1813698)



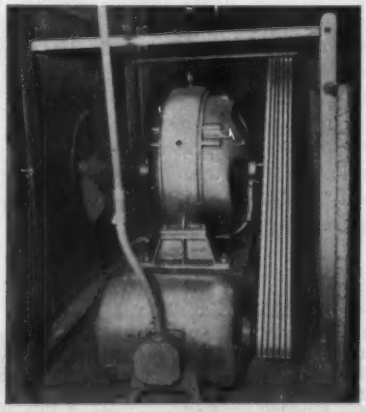
You find that the CONCAVE SIDES *fill out* and become perfectly straight. They thus press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the GATES VULCO ROPE—and this means *longer* belt *life* and *lower* belt *cost* for you!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the GATES VULCO ROPE!

VULCO ROPE DRIVES

THE GATES RUBBER COMPANY
DENVER, U.S.A.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

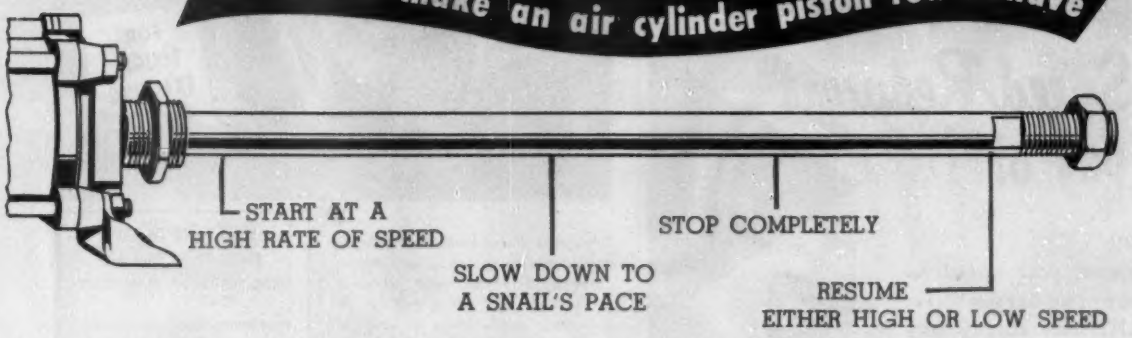


Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

CS-948

Skip CHECK — *Stop* CHECK

or how to make an air cylinder piston rod behave



Start an ordinary air cylinder and its natural tendency is to proceed at a fairly uniform rate to the full length of its stroke.

But with this "packaged" air cylinder power unit the piston rod can start its advance at a high rate of speed, slow to a snail's pace when you wish, stop completely at any desired point, and resume either a slow or high speed as you prefer.

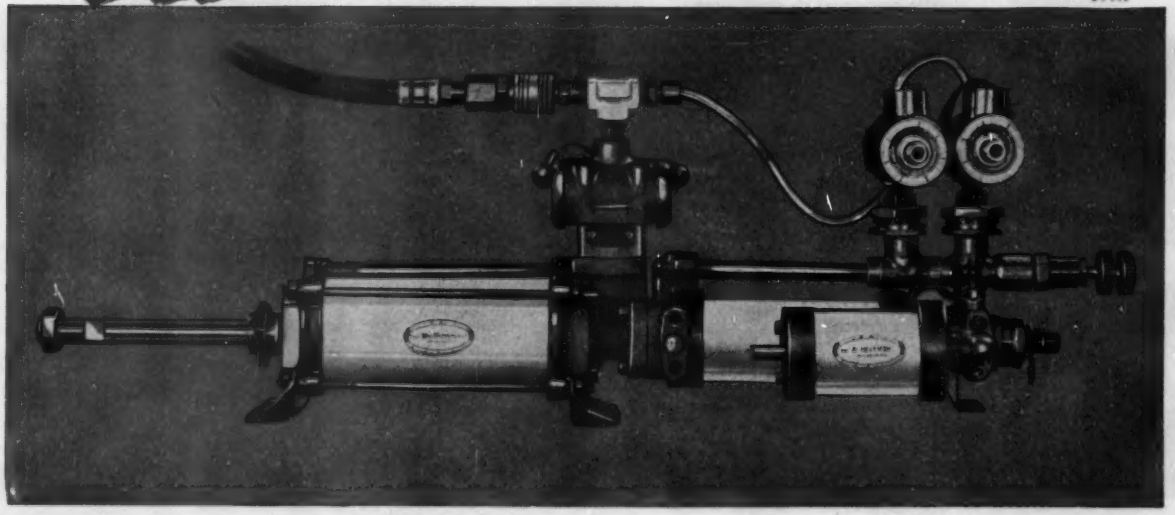
Not all pneumatic applications require the range of piston rod speed control available in this model DCSTSBEM combination Bellows Air Motor and Hydro-Check, of course. But, regardless of the type of control you require, you can obtain it in Bellows Air Motors . . . and usually in the form of one compact, complete, "packaged" unit — simple to install, doubly simple to control.

Ask your Local Bellows Field Engineer to show you the range of control possibilities in Bellows Air Motors and Hydro-Checks — or write for a copy of our new free 36-page bulletin. Ask for Bulletin CL-50. Address Dept. AM-54 The Bellows Co., Akron, Ohio. In Canada, Bellows Pneumatic Devices of , Ltd., Toronto. In California, The Bellows Co. of California, Los Angeles.

The Bellows Co.

AKRON 9, OHIO

811A



for trouble-free service

Grant Speed Reducers pay off!

Whatever your speed reducer requirements, GRANT can supply any one of eight different types, each manufactured in a complete range of sizes.

Or if your need be something special, GRANT will make a Speed Reducer to your specifications.

PAY-OFF ASSURED

GRANT Speed Reducers, with precision-cut gears and accurately ground shafts encased in cast iron housings, assure you of long, trouble-free service.

Write for GRANT's new catalog for information on their complete line of gears and reducers.

GRANT GEAR WORKS INC.

This 2500 pound steel spur gear of manganese moly stock, was fabricated by Stahl for tough, exacting service in a steel rolling mill. For all your gear needs, large or small, in any quantity, benefit from Stahl's many years of precision gear manufacture—your inquiry will get prompt attention.

SPURS TO 72" PD, 1 DP
BEVELS TO 54" PD, 1 DP
SPIRAL, HELICAL and WORM GEARS TO 48" PD, 2 DP
CONTINUOUS-TOOTH HERRINGBONE TO 60" PD, 2 DP
SPROCKETS TO 72" PD, 2½" CP
RACKS TO 20 FT. LONG, 3 DP
SILENT GEARS; RAWHIDE, BAKELITE, FIBROIL
HEAT-TREATED, CASE OR FLAME HARDENED GEARS— OF CARBON OR ALLOY STEEL

Stahl GEAR & MACHINE COMPANY

3901 Hamilton Ave. Cleveland 14, Ohio

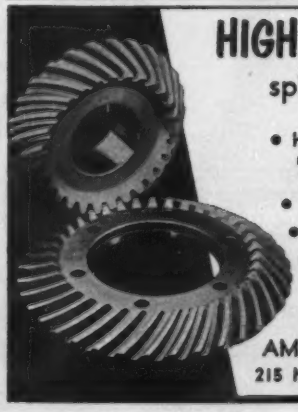
BEVEL GEARS AND BEVEL PINIONS WITH LONG STEMS

ALL TYPE GEARS

BILGRAM

BILGRAM GEAR & MACHINE WORKS

1217-35 Spring Garden, Philadelphia, Pa.



HIGH QUALITY spiral bevel gears

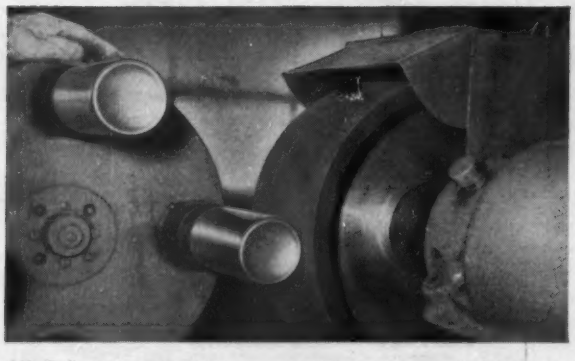
- Heat treated and lapped in matched sets for high speed operation.
- Pitch diameter 2.5" to 14"
- Diametral Pitch 3 to 7
- Production lots only
- Submit prints for estimates

AMARILLO GEAR WORKS

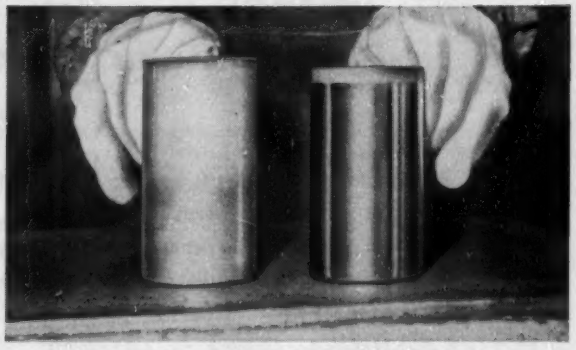
215 N. Polk St. Amarillo, Texas

How would you solve it?

(1) Production Problem: To cut unit costs of grinding and polishing stainless steel whip-cream dispenser cans. Nilsen Mfg. Co. had been jobbing out the cans to an outside source, paying a high .08¢ per can, due to old-fashioned methods, labor, material and delivery costs.



(2) Solution: A 3M Representative recommended that this Addison, Illinois, manufacturer install the 3M Method, using Grit #180 Resin Bond Belts running over a special contact wheel. Cans were placed on automatic work holders.



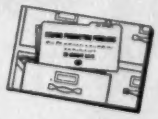
(3) Results: An immediate reduction in polishing costs. By installing the 3M Method, and doing the work themselves, Nilsen Mfg. Co. cut costs to only $.0125 per finished unit . . . a saving of $.0675 per can! A 3M Representative can help you solve your grinding and finishing problems, too. His services are available without cost or obligation.

3M ABRASIVES

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: London, Ont., Can. Export: 122 E. 42nd St., New York City. Makers of "Scotch" Pressure-Sensitive Tapes, "Scotch" Sound Recording Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

WANT MORE INFORMATION?

Minnesota Mining & Mfg. Co.
Dept. AM-114, St. Paul 6, Minn.



☐ *Send me free booklet: "Case History Reports on 3M Abrasive Belts"*
☐ *Have 3M Representative Call*

NAME _____ **TITLE** _____

COMPANY _____

ADDRESS _____

CITY _____ **ZONE** ____ **STATE** _____

production begins with

Columbus Die-Tool

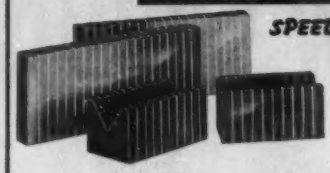
It takes the right machinery to build your product right! Columbus Die-Tool individually designs and builds tools, dies, and special machinery to produce your product alone. This gives you the advantages of lower operating cost, greater production and a higher quality product.

Let Columbus Die-Tool's more-than 46 years of designing and engineering experience go to work for you. Contact CDT today about your special die, tool and machinery requirements.

Columbus Die-Tool
AND MACHINE COMPANY
P. O. BOX 750 • COLUMBUS, OHIO
ESTABLISHED 1906

Manufacturers of
JIGS • FIXTURES • BUILDING MACHINE TOOLS COMPLETE
SPECIAL TOOLS • UNITS FOR MACHINE TOOLS

MAGNE-BLOX



SPEED SURFACE GRINDING SET-UPS WITH MAGNE-BLOX
Laminated Parallels
V-Blocks & Angle Irons

- Grind Work Square
- Grind Work Parallel
- Hold Round Pieces
- Save your Magnetic Chucks
- Eliminate Clamps
- Eliminate Holding Devices

UNIVERSAL SET Code GANBO In Case $22.25

Write for Folder—Code GINXA

RADIUS DRESSER

SPEED UP PRODUCTION with the "Little Wonder" RADIUS DRESSER

Dressing and Shaping Grinding Wheels up to 1" Convex or Concave Without Diamond - Code GANLE $39.50

Natural Pointed 1/3 K. Diamond $6.50

Better Support by using Swinging Arm pivoted on Lapped Centers, eliminating Vibration and giving Better Finish.

Write for Illustrated Folder—Code GINYV

GEORGE SCHERR CO., Inc.
COMPLETE LINE OF PRECISION INSTRUMENTS
200 AM LAFAYETTE ST. • N.Y. 12, N.Y.

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1 in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

H&G Insert Chaser DIE HEADS

famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

THE EASTERN MACHINE SCREW CORP., 29-40 Barclay St., New Haven, Conn.
Pacific Coast Representative: *A. C. Behringer, 334 N. San Pedro St., Los Angeles, Calif.* Canada: *P. F. Barber Machinery Co., Toronto, Can.*

GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Sillimas Ave., Bridgeport, Conn., U. S. A.

You save money when your steel parts can be made from special sections

The pinion gear window regulators shown above were made from Republic Cold Drawn Special Sections. They were made at less cost because much of the machining was eliminated.

You can save, too, because Republic Cold Drawn Special Sections are already formed to the predominating cross section of your part.

Your parts also benefit from the increased physicals produced by cold drawing. It gives them higher strength, greater hardness and a bright smooth finish that rarely requires further finishing.

Large tonnage requirements are not necessary, but they do result in greater economies. We can produce cold drawn sections in large or small quantities to meet your requirements. Sections can be produced in a wide variety of analyses. Possibilities for variation in contour are almost limitless.

A Republic representative will be happy to call at your plant. Or send us samples or blueprints of your parts. We will tell you promptly and impartially whether the nature of your parts would make the use of Republic Union Drawn Special Sections efficient and economical.

REPUBLIC STEEL CORPORATION

Union Drawn Steel Division • Massillon, Ohio

GENERAL OFFICES • CLEVELAND 1, OHIO

Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC *Union*

REPUBLIC STEEL

COLD DRAWN STEELS

These sample shapes are only a few of thousands produced by Republic. They may give you an idea on how you can use Republic Cold Drawn Special Sections for your product.

Automatic
POINTING MACHINES
for bolt and
cap screw pointing

TYPE 4600

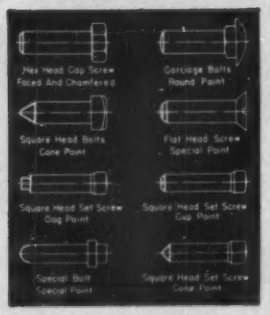
ECONOMY Automatic Pointing Machines are hopper fed and automatic in operation. These features enable operator to run several machines resulting in greater productivity and lower costs.

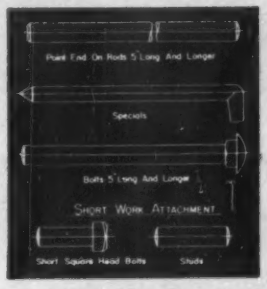
These Automatic Pointers are available in two sizes—Type 3300 for uniformly pointing bolts and screws to 3/8" diameter and 3/4" to 3-1/2" in length, the type 4600 for pointing bolts and cap screws 1/4" to 3/4" diameter and 1" to 6" in length. A single machine will handle all types of points on many types of bolts and cap screws.

Production rates of the type 3300 vary infinitely from 2,000 to 6,000 finished parts per hour and on the type 4600 from 1800 to 5400 per hour.

Also available is the type "P" Semi-Automatic Pointing Machine for pointing bolts, cap screws, studs and rods 1/4" to 1-1/2" diameter, 5" or more in length. Production rates up to 2,000 pieces per hour make it a valuable secondary machine for short runs.

Consult ECONOMY on low cost, high production Bolt and Screw Pointing operations.


Hex Head Cap Screw Faced And Chamfered
Carriage Bolts Round Point
Square Head Bolts Cone Point
Flat Head Screw Special Point
Square Head Set Screw Dog Point
Square Head Set Screw Cup Point
Special Bolt Special Point
Square Head Set Screw Cone Point
Typical parts machined on the TYPE 4600

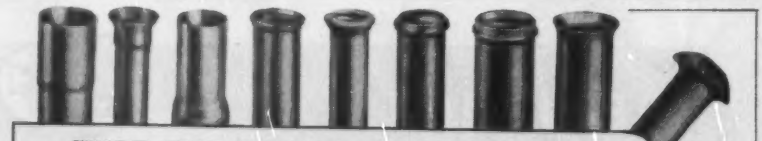


Typical operations performed on TYPE "P" Semi-Automatic Pointing Machines

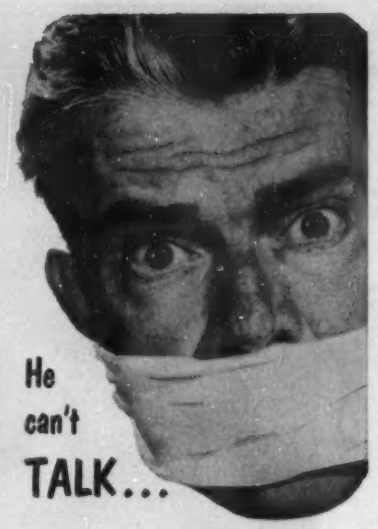
THE ECONOMY LINE

Automatic Shaving Machines
Automatic Pointing & Shaving Machines
Automatic Pointing Machines
Semi-automatic Pointing Machines
Automatic Pointing & Threading Machines
Double End Automatic Pointing Machines

THE ECONOMY ENGINEERING CO.
WILLOUGHBY, OHIO
WILLOUGHBY-OHIO
Designers and Manufacturers of Secondary Operation Machines since 1915



TUBE END FORMING MACHINERY
for
Beading—Flaring—Flanging—Expanding—Reducing —Sinking—Swaging—Grooving—Double Lap Flaring and Flanging 1/8" to 4½" TUBING
Write for General Bulletin G-3
VAILL *Engineering Company*
137 E. MAIN ST., Rear
WATERBURY 20, CONN.



(So we'll say it for him.) The ingenious new SMITH'S "Flo-Trol" design eliminates back-fire and prevents burned-out valve seats in Smith's oxy-acetylene cutting torches. It's fool-proof. You can't go wrong.

Write us a card — we'll give you the facts.

SMITH WELDING EQUIPMENT CORPORATION
Dept. AM-111 2633 S. E. 4th St. Minneapolis, Minn.

Does jobs no drill can do!
up to 10 Times Faster than Boring!

NEW Clark "HOLE-MAKER"

Totally new—maximum rigidity, no chatter! Roughs or finishes holes to exact size in FORGINGS, CASTINGS, BOILER PLATE, THIN STOCK, TUBING; CROWNED, CYLINDRICAL AND FLAT SURFACES. One of 3 blades is *always* in the cut on odd work shapes—*smooth action even on intermittent cuts!* Use new HOLE-MAKERS in radial drills, drill presses, turret lathes, portable electric or pneumatic drills, etc. Excellent for trepanning and rough boring I.D.'s in Tubing, Castings, etc...a real production tool!

Holes can't drift, spindle can't deflect—it's piloted 2 ways!

Cuts steels, plastics, transite, non ferrous metals, stainless steel, etc!

5 ADJUSTABLE SIZES: Specify Straight Shank or M.T. 2. 3. 4. Other tapers on order.

Models:	102	203	304	405	506
Capacity:	1" to 2"	2" to 3"	3" to 4"	4" to 5"	5" to 6"

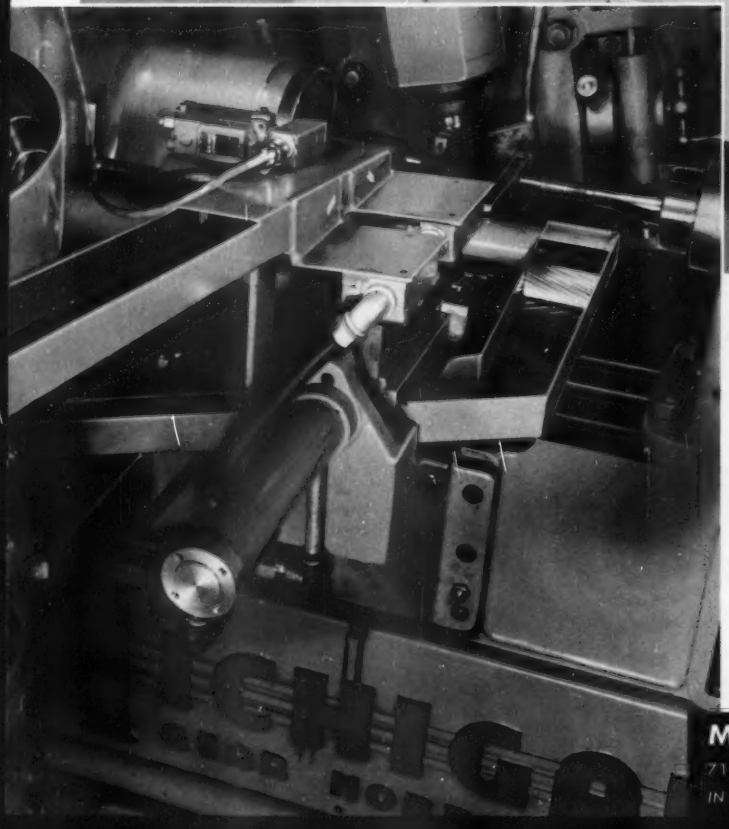
Order from your dealer or write for catalog!

ROBERT H. CLARK COMPANY
9330 Santa Monica Blvd., Beverly Hills, Calif.

Announcing

This Month's

GEAR PIX



THE NEW ULTRA-SPEED 5″ GEAR HOBBER

New in principle, this Michigan "Ultra-Speed" No. 1445 hobber hydraulically crossfeeds the hob across the work at the helix angle of the gear. Hydraulic plunge-feed, tail-stock, and hob-shift speed up the hobbing cycle. Fast, simple setup for short runs. Can be equipped with automatic hopper feed for long production runs. Hobs helical or spur gears up to 8 pitch, 4″ face and 5″ diameter at hob speeds up to 570 rpm. Ask for bulletin LH-54.

MICHIGAN TOOL COMPANY

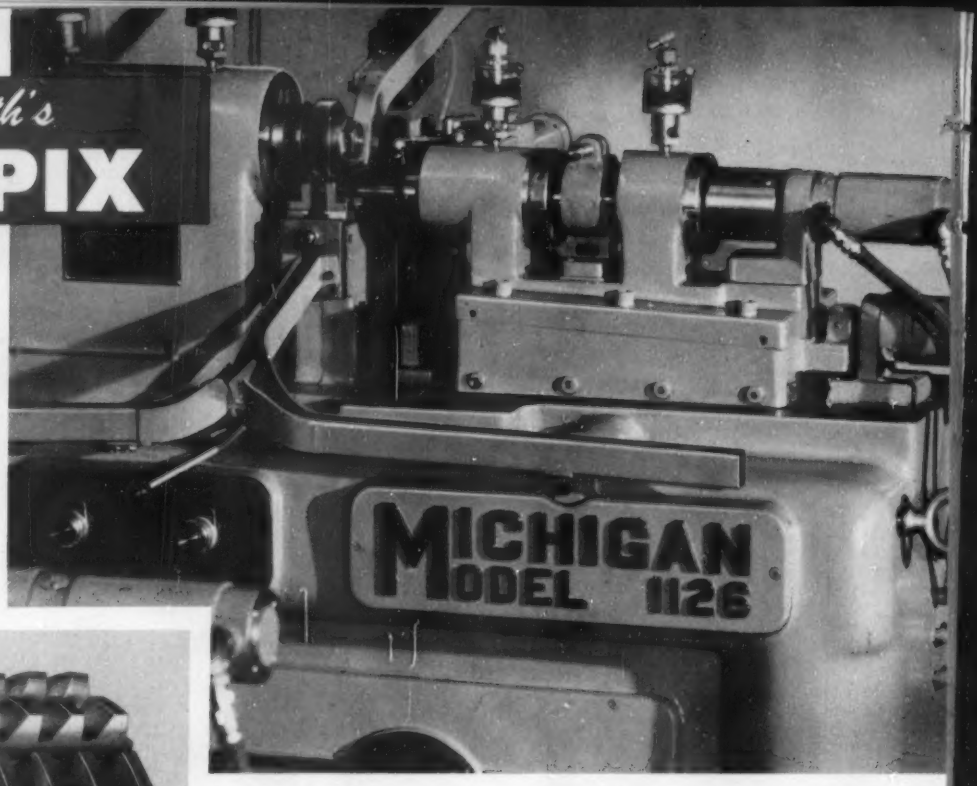
7171 E. McNICHOLS RD. • DETROIT 12, MICH.

IN CANADA: COLONIAL TOOL CO., LTD., WINDSOR, ONT.

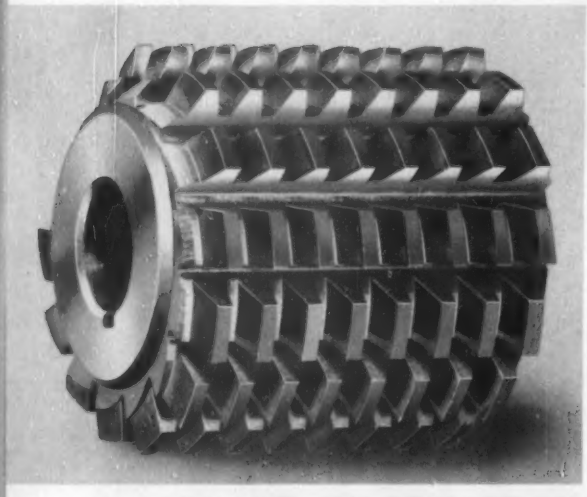
Over

This Month's

GEAR PIX



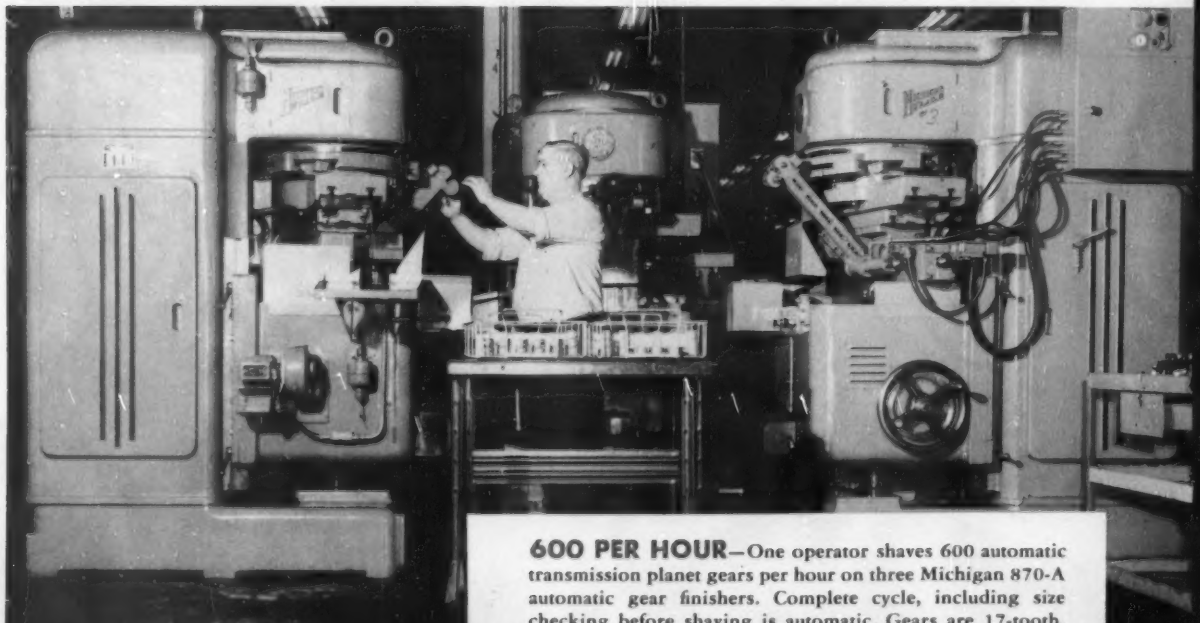
AUTOMATED SPEEDER—The operator just listens to the speeding gear to learn whether it is ok—then flicks the lever to send it down the ok or reject chute. Gears are hopper fed down a chute and automatically loaded and unloaded. Hoppers are mounted behind a soundproof wall.



INCREASE HOB LIFE—Hob life can be increased as much as 225% by reducing the amount of stock that is removed per sharpening.

For instance, a 7 pitch hob where .030″ stock must be removed each time can only be sharpened 12 times. If .020″ stock is removed, it can be sharpened 19 times. But if sharpening requires only .010″ stock to be removed at a time, the 7 pitch hob can be sharpened a total of 38 times.

There are times when it is advantageous to get maximum production between sharpenings, even though it does require excessive stock removal. Each individual case should be decided on its own merits.



600 PER HOUR—One operator shaves 600 automatic transmission planet gears per hour on three Michigan 870-A automatic gear finishers. Complete cycle, including size checking before shaving is automatic. Gears are 17-tooth, 1.2922″ pitch dia., 1.123″ face, 20° L.H. helix.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS RD. • DETROIT 12, MICH.

IN CANADA COLONIAL TOOL CO. LTD. WINDSOR, ONT

Over

Type
No. M34 Vertical Spindle

Capacity
24" long x 8" wide x 12" high

Spindle
5HP, 3450 RPM motorized

Feeds
Power traverse, hand cross feed, automatic down feed

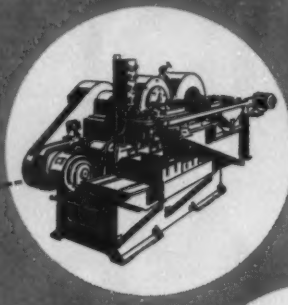
Abrasive No. M34 Surface Grinder has a vertical spindle — the only grinder in its capacity range to offer this speed-up feature. Tool rooms and production shops alike know they can count on Abrasive No. M34 to produce flat surfaces and fine finishes fast and economically. And for dimensional control, they find this grinder unbeatable. In addition, the 90° angle head can also be tilted for extra fast stock removal.

Write today for your copy of the detailed Abrasive No. M34 catalog. Abrasive Machine Tool Company, 8 Dunellen Road, East Providence 14, Rhode Island.

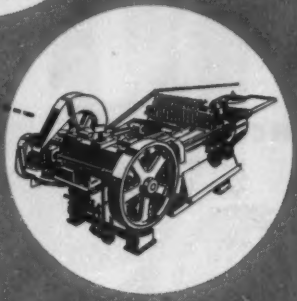
ABRASIVE
ACCURACY BOOSTS PRODUCTION

Abrasive Quality is Reflected in the Finish of Your Product

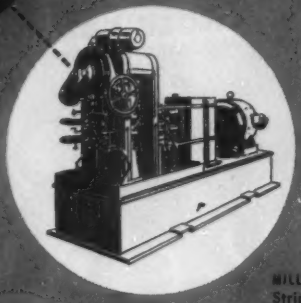
5 KINDS OF WATERBURY FARREL ANSWERS TO YOUR MASS PRODUCTION PROBLEMS



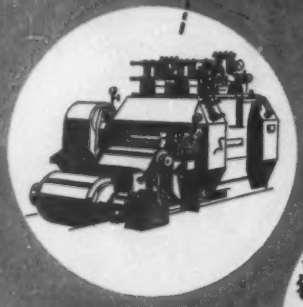
COLD PROCESS BOLT & NUT MACHINERY — Headers (all types) • Rivet Machinery • Trimmers • Thread Rolling Machines • Slotters • Nut Formers and Tappers, etc.



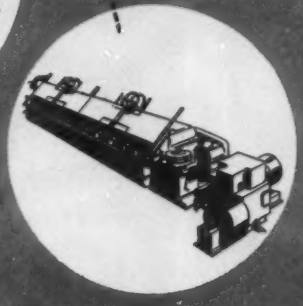
POWER PRESSES—Crank, Cam and Toggle; also Rack and Pinion Presses • Eyelet Machines • Multiple Plunger Presses • Horizontal and Hydraulic Presses, etc.



MILL MACHINERY — Rolling Mills: Strip, Rod, Wire Flattening, (For Ferrous and Non Ferrous Metals) • Also Slitters • Straighteners • Cut-off Saws • Coilers • Winders, etc.



SPECIAL MACHINERY — Sendzimir Mills • Small Arms Ammunition Machines • Collapsible Tube Machines • Coining Mills, etc.



WIRE MILL EQUIPMENT — Continuous Wire Drawing Machines (Upright Cone and Tandem) • Wire Flattening Mills • Chain Draw Benches • Pointers • Swagers • Bull Blocks • String-up • Machines • Spoolers, etc.

Within These Basic WF Equipment Lines, Individual Machines Are Custom-Engineered For Specific Applications

If your metal-working machinery problem falls into any of these five groups, there are good reasons for looking to Waterbury Farrel for the answer.

There's Waterbury Farrel's continuing engineering research with more than a century of machine building experience to draw upon. This results in soundly designed and thoroughly tested features which improve production.

There's Waterbury Farrel's world-wide reputation for rugged, long-lasting construction. This gives you the assurance that WF machines are built to provide long years of uninterrupted production.

Waterbury Farrel can custom-engineer special equipment or adapt a standard machine to fit your specific problem.

For further information, write for free booklets on any of the machines mentioned on this page or contact your nearest WF office.

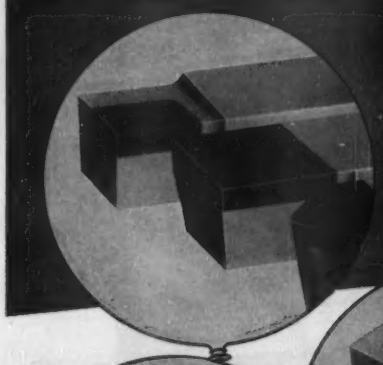
HERE'S A SAMPLE **of Waterbury-Farrel mass production equipment in action. This complete WF automatic production unit combines a 40-ton double-acting, upright blanking and cupping press, a conveyor feed and four 7-station horizontal drawing presses to draw 340 zinc shells per minute.**

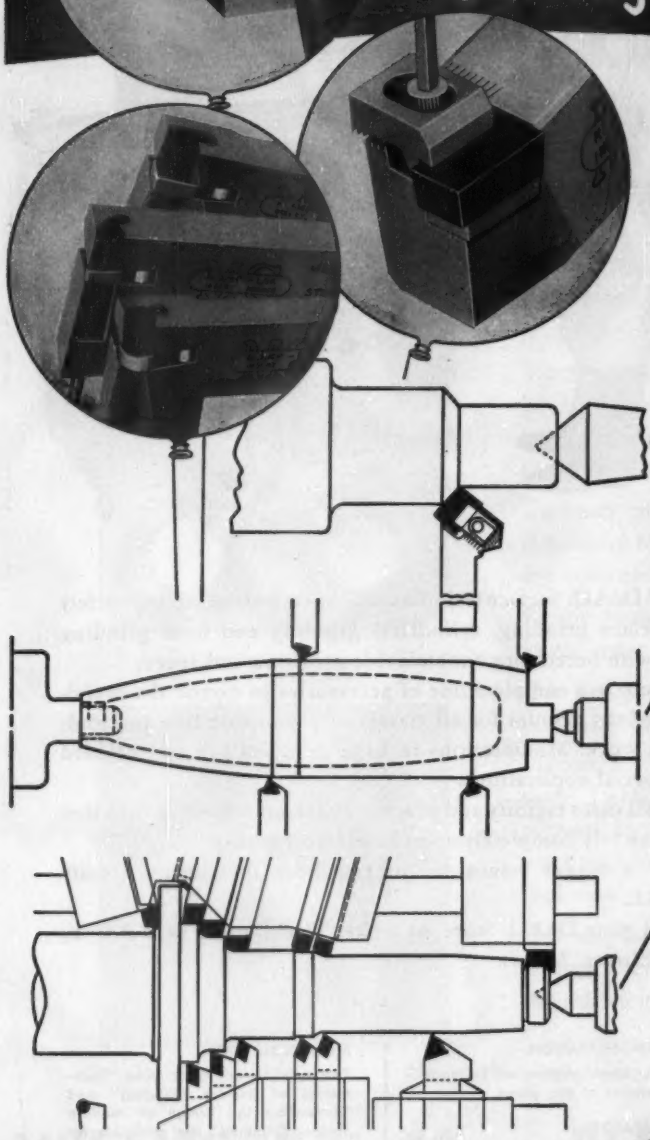
FOUNDED WATERBURY FARREL 1851

WATERBURY FARREL FOUNDRY & MACHINE CO. • WATERBURY, CONN.

Offices: Chicago, Cleveland and Millburn, N. J.

Talide Tipped Tools for EVERY Cutting Operation





USERS REPORT SUPERIOR RESULTS

LARGE PITTSBURGH ROLL FOUNDRY

PART	SAE 52100 forged chrome steel mill roll 28" O.D.
OPERATION	Rough turn and finish machine roll necks and barrel.
MACHINE	48" x 15' Mackintosh-Hemphill Lathe, 50 H.P. motor drive.
TOOL	H-Style Klamp-Lok Toolholder with horizontal clamped Talide insert—Grade S-88 for roughing —Grade S-92 for finishing.
DEPTH OF CUT	¼" for roughing cuts. 1/16" for finishing cuts.
FEED	.050
S.F.M.	125 to 210
RESULTS	Talide tools held cutting edge 40% longer per grind than previous grade used — even at temperatures of 1700° Fl

LARGE CHICAGO SHELL PLANT

PART	105 M/M (M-1) H.E. Shell.
OPERATION	Rough turn shell body, 1050 Steel Forging.
MACHINE	12" x 21" Fay Automatic Lathe.
TOOLS	TB-16 Triangular Talide Inserts with 3/32" radius vertically clamped in Klamp-Lok Toolholder Grade S-92.
DEPTH OF CUT	¾"
FEED	.035
S.F.M.	325
RESULTS	45 Shells per grind or 25% increase over previous average of 35 shells.

LARGE MID-WEST TRACTOR PLANT

PART	Shaft Steering Clutch, SAE 8654-H Brinell 370.
OPERATION	Rough Straddle Face Flange, turn all diameters, form undercut and base.
MACHINE	16 x 60 Sunstrand Automatic Lathe.
TOOLS	8 Talide-tipped facing, chamfering, radius and form tools Grade S-88. 7 Klamp-Lok Toolholders with round, triangular and parallelogram Talide Inserts Grade S-88.
DEPTH OF CUT	9/32" to 7/16"
FEED	.022
S.F.M.	156
RESULTS	Production up 20% — Scrap and rejects down.

Complete stocks of standard Talide Tools and Tips are immediately available from our warehouses located in Newark, Youngstown, Detroit, Chicago and Los Angeles. Write for General Catalog No. 54-G, Metal Carbides Corporation, Youngstown 7, Ohio.

METAL CARBIDES CORPORATION
MC
TALIDE
YOUNGSTOWN 7, OHIO
SINTERED CARBIDES · HOT PRESSED CARBIDES
HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

To get more from your Surface Grinder Investment

. . . take advantage of DoALL *Versatility* plus *Precision!*

FORM GRINDING
. . . Plunge and Crush Grinding

CYLINDRICAL GRINDING

ANGULAR GRINDING

AUTOMATICS AND SPECIALS

NEW DoALL Surface Grinders will handle an unlimited variety of surface grinding, cylindrical grinding and form grinding jobs with heretofore unobtainable precision and speed.

There is a complete line of accessories to extend the usefulness of the grinder for all classes of production line and toolroom work. Modifications in basic grinders can be provided for special applications.

In all cases rigidity and precision of the machines is such that you can rely completely upon handwheel settings.

For a bigger return on your grinder investment, specify DoALL.

Call your DoALL Store, or write: *THE DoALL COMPANY, Des Plaines, Illinois.*

FREE DEMONSTRATION.
A grinder demonstration will be made upon request at any plant.

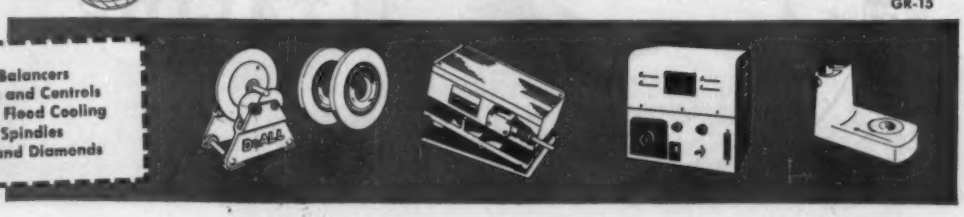
NEW CATALOG.
Contains complete data on 7 new DoALL grinder models.

MOTION PICTURES.
Two new sound, color films "Techniques of Surface Grinding" and "Extending the Range of Modern Surface Grinding" are available for group showings.

DoALL

GR-15

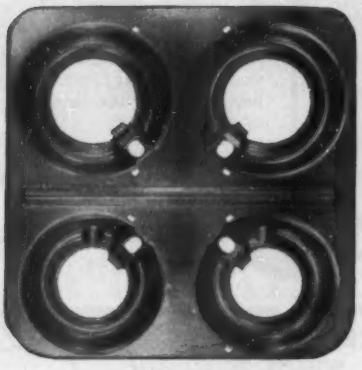
Wheels and Balancers
Magnetic Chucks and Controls
"Cool-Grinding," Flood Cooling
High Speed Spindles
Radius Dressers and Diamonds

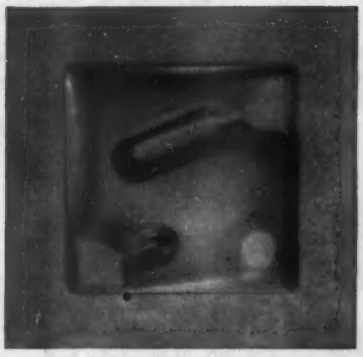


Plastic Low Cost Tooling

For

Dies . . . Drill, Welding, and Assembly Jigs





Vulcan, keeping pace with modern tooling, can recommend plastic tooling for medium production on numerous tool programs.

Plastic tools are light in weight, have good impact, compressive strength and dimensional stability. No hand finishing of parts required as galling or marking is eliminated by using plastic form dies.

Contours and odd shapes are cast or laminated to suit individual tools, saving expensive machine and hand finishing operations.

Plastic tools, built in a matter of days instead of weeks, lower your tool costs for those medium production runs.

Our actual production figures prove plastic has a definite place in modern production.

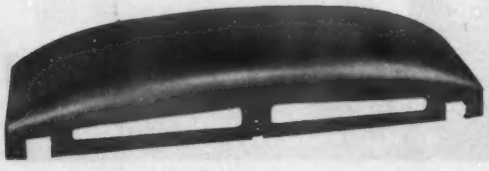
Vulcan Tool Company's organization, building fine tools since 1916, believes new tooling developments must be proved by tool engineers. Since plastic is not a cure-all your problem should be handled by recognized, practical tool men.

Our engineering staff will recommend the correct plastic material and advise if parts of your tooling program should be in plastic.

Send a part print and your production requirements for quotation and recommendations.

VULCAN TOOL CO. . . . PLASTIC TOOL DIVISION

788 LORAIN AVE., DAYTON 10, OHIO



Major Vulcan Services

Engineering, Processing, Designing and Building Special Tools . . . Dies . . . Special Machines . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and Size, Vulcanaire Jig Grinders, Plastic Tooling.

YESTERDAY'S PIONEER . . . TODAY'S LEADER

WELDON

MEASURING ATTACHMENT

for Lathes

(Direct Reading)

Saves Time • Reduces Waste

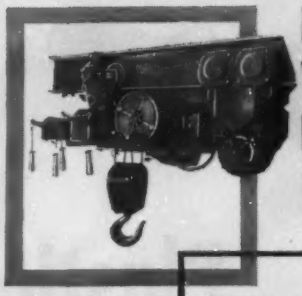
• This handy Weldon attachment measures directly the forward or reverse movement of the lathe carriage, within .001 of an inch. Easily attached to most lathes by drilling and tapping of one hole. • Dependable, accurate, convenient . . . saves time and reduces work spoilage.

Write for Circular LA-1

Weldon distributors throughout U. S. A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY

3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO



PROFESSIONAL WEIGHT LIFTER ELECTROLIFT

It takes just one man to lift and move those heavy loads around your plant with ElectroLift—the modern, time and man-saving worm drive hoist.

Designed for high-speed operation, ElectroLift hoists are safe, compact, smooth-operating and quiet. Available in sizes up to 6 tons with optional pushbutton control.

For complete details on the features of ElectroLift consult your ElectroLift representative listed in telephone directory or write:

ElectroLift, Inc.
204 Sargeant Avenue, Clifton, N. J.

ELECTROLIFT

2176

PRECISION DIES

CAN BE ENGRAVED BY ACROMARK SKILLED ENGRAVERS AND MODERN ENGRAVING EQUIPMENT.

The ACROMARK Company

WE DO OUR OWN HEAT TREATING

7-13 MORRELL ST., ELIZABETH 4, N. J.

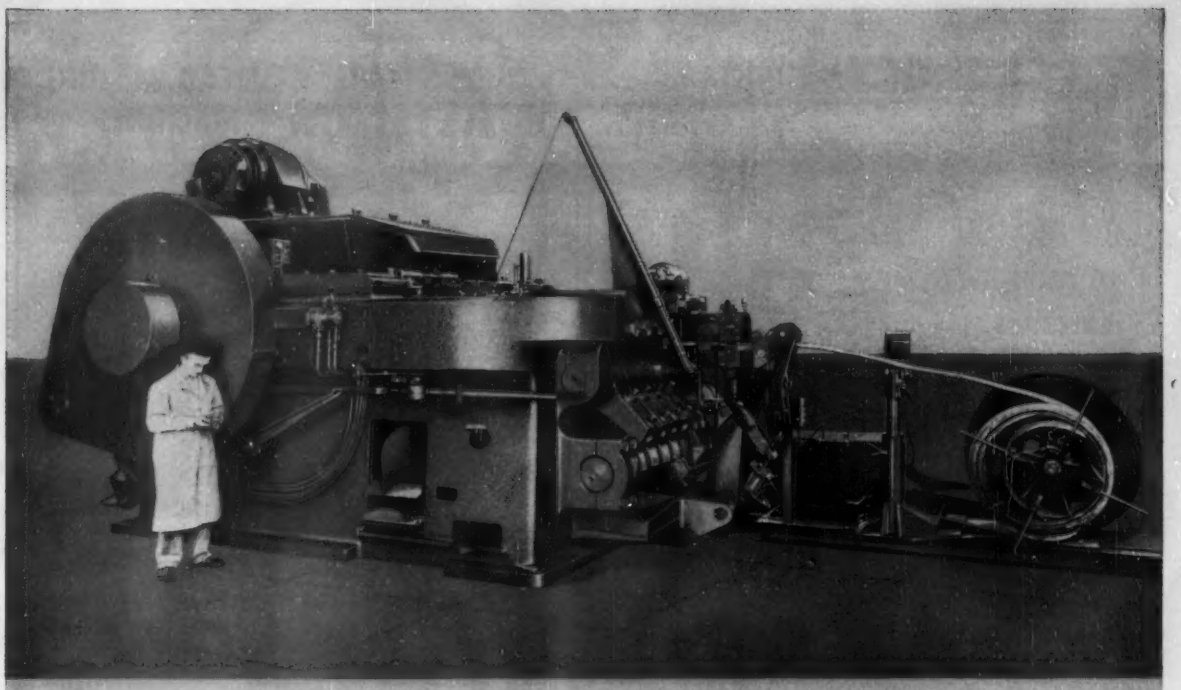
H & W DIEING MACHINES
HIGH SPEED STAMPING
LONG DIE LIFE

HENRY & WRIGHT, *Division of Emhart Mfg. Co.*
481 WINDSOR ST. HARTFORD 1, CONN.

I'm the **W.H.O.*** of

WHO'S WHO
in the precision screw machine products field
Making the finest
COUPLING BOLTS CAP SCREWS
MILLED STUDS SET SCREWS
. . . our specialty . . .

*Wm. H. Ottemiller Co. YORK, PENNA.
Ottemiller products are sold through Mill Supply Houses and Industrial Distributors.



AUTOMATIC FORGING MACHINES!

This is the largest high-speed automatic cold-forming machine yet built, and larger ones are in the works.

Using 1-1/2-inch diameter coiled hot-rolled stock, this 200,000 pound machine, designed and built by NATIONAL, automatically produces 40 clean, accurate parts per minute!

Through the years we have teamed up with industry on many novel automatic hot and cold forging installations — for making a wide variety of fasteners, automotive and aircraft components, and other parts.

If you need to make metal parts faster, stronger and at lower cost, let us work with you. Send us your prints and samples, or better yet, visit us. No obligation.

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO—SINCE 1874

DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS • BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS

Hartford Detroit Chicago

an ACCO product

Wilson Diamond "Brale"* Penetrators

TO BE SURE of accurate hardness tests use only a "BRALE"*

• A penetration error of *80 millionths of an inch* throws a hardness reading off one full point.

That is why the WILSON Diamond "Brale" Penetrator is required for accurate testing of heat-treated steel on the WILSON "ROCKWELL"* Hardness Tester. It is precision ground under high magnification to assure mathematical and microscopic accuracy. Each Brale is accurate to the degree required even for a research laboratory. N Brale penetrators are for use with WILSON "ROCKWELL" superficial testers.

There is a WILSON "ROCKWELL" Hardness Tester for every requirement including the WILSON TUKON for micro-indentation testing. Write for literature and prices.

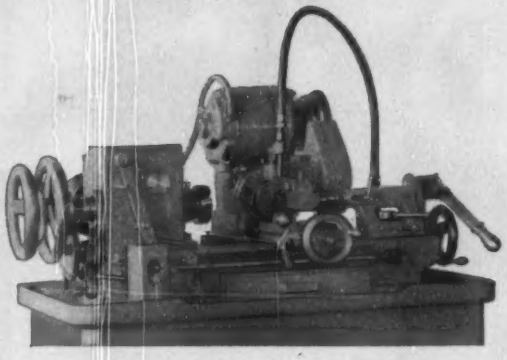
*Trade Mark Registered

ACCO

Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE
230-B Park Avenue, New York 17, N. Y.

Complete line of Hardness Testers

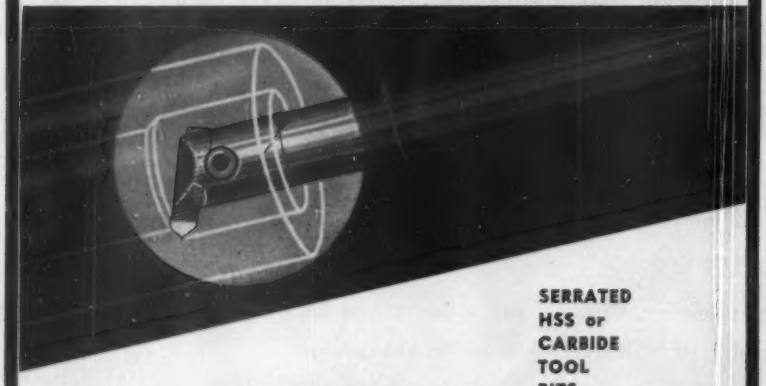
IMPROVED THREAD MILLING
WALTHAM MACHINES



Several improvements in design have recently been made that are not mentioned in our descriptive bulletin. Send for supplementary sheet that lists these improvements and presents an illustration of the whole machine.

WALTHAM MACHINE WORKS, INC.
HIGH STREET, WALTHAM, MASSACHUSETTS

Newest Development in Precision Boring Tools



NEW "BH" BORING BARS overcome the major disadvantages of conventional bars:

- Both clamp and insert are serrated to insure the firmest grip possible, even with little pressure on the clamp.
- New advanced clamp design eliminates strain on the inserts and prevents breakage of tool bits.
- Carbide and HSS inserts have a half-elliptical shape for better side clearance and more strength, less chatter.

Write for free catalog to:

SERRATED HSS or CARBIDE TOOL BITS

IN CANADA
CANADIAN M. S. E.
171 Kipling Ave. S.
Toronto 18, Ontario

R. B. TOOL Co., Inc. 785 North Broadway White Plains, N. Y.

How to estimate the time element in any machining job

Use this manual to make the winning but safe bids that mean more jobs and better profits for your shop.

Machine Shop Estimating

BY W. A. NORDHOFF
Douglas Aircraft Company, Inc.

488 pages, 488 illus., $7.00

Here's the kind of on-the-job help you need to make quick, reliable estimates of the time it takes to do the different machining operations in any machine-shop large or small. Whether a job involves drilling, boring, tapping, threading, grinding—or any of the scores of other operations—this handy manual tells you exactly what to consider in estimating job-time.

It covers every step—from setting up a job, to tearing it down—giving the specific time value established for each element. The various non-machining operations which enter into the cost of any job are also given. Instructions are provided for the use of several methods of estimating particular jobs on each type of machine in use today.

SEE THIS BOOK 10 DAYS FREE

McGRAW-HILL BOOK CO., INC.
330 W. 42nd St., NYC (18)

Send me Nordhoff's MACHINE SHOP ESTIMATING for 10 days' free examination on approval. In 10 days I will remit $7.00 plus few cents for delivery, or return the book postpaid. (We pay for delivery if you remit with this coupon—same return privilege.)

(Print)
Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position FA-11-22-54

This offer applies to U.S. only.

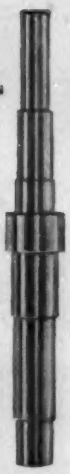
DO THEY SET TOLERANCES CLOSER THAN YOU CAN DELIVER?

GET A

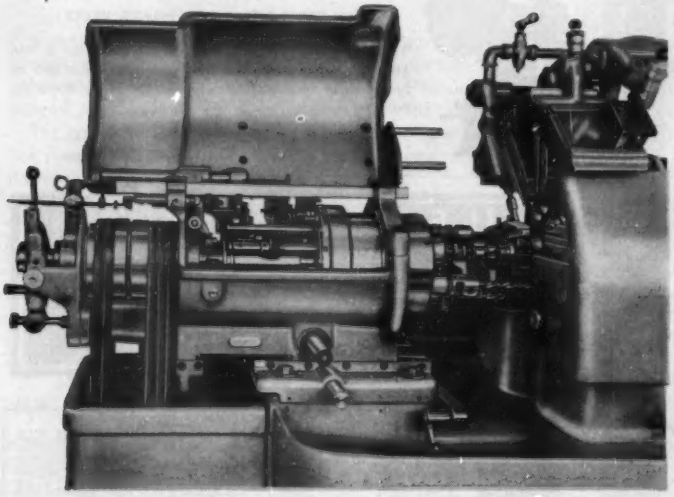
BECHLER
SWISS AUTOMATIC

Job sheets are specifying closer tolerances all the time. With Bechler Swiss automatics you can turn workpieces to within tenths. Furthermore, Bechlers are built in 2 different models—the latest with drum-turret is made in 3 sizes, the standard in 4—so you can get the one that fits your production needs (in short, you don't have to buy more machine than you want).

Bechler standard Swiss automatic—5 single-point tools for turning pins, staffs, arbors, shafts, pinions, and studs. Comes in 4 sizes with diameter capacities from 1/32" to 1 1/4". Maximum turning length is 9".



Stainless steel shaft 3/8" dia., 2 3/4" long, diameters held to .0003", concentricity .0005", finish 16 micro inch.



Bechler drum-turret Swiss automatic—12 work stations include 5 cross tools, 6 turret positions, and 1 pick-up position. For machining hubs, fittings, valves, housings, couplings, nozzles or other intricate precision parts with multiple end operations including internal and external threading. Comes in 3 sizes with diameter capacities from 1/32" to 1 1/4". Maximum turning length is 9".

- Service centers in New York and Los Angeles—factory trained men will plan layouts, produce tools, cams, and make set-ups.
- Complete stock of attachments, spare parts, and cams.

Enlarged cross-section of a nozzle: 3/8" dia., 3/4" long, three holes of different sizes, internal and external thread, and knurl.

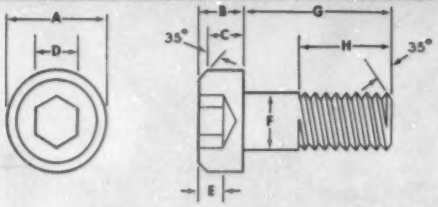
Let us recommend the right Bechler for your precision job. Or, write for bulletin.

COSA — *nationwide sales and service of precision machine tools —from bench lathes to boring mills.*

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

Mac-it®

DESIGN ENGINEERING at YOUR Service..



MAC-IT PARTS COMPANY							
MATERIAL SAE 9/90 STEEL ALLOY - ROCKWELL							
FINISH CHROMIUM PLATING ON STEEL G.M 4251-							
TOLERANCE IN LENGTH THE TOLERANCE IN LENGTH							
A	B	C	D	E	F	G	H
3/8	244	229	185	127	248	5/8	3/8

FASTENER DESIGN

Mac-it socket-head screws, providing strength without bulk, give lighter weight, streamlining, and more secure fastening to equipment you design. Whether the design problem involves standard or special screws, Mac-it will add to the appearance, efficiency and performance of the equipment. Use Mac-it Fastener Engineering Service for all problems involving screws for any type application

MAC-IT PRECISION

The precision manufacture and quality control used in making Mac-it Screws provide users with high dimensional accuracy and uniformity. All Mac-it Screws in both coarse and fine threads are held to a class-3 fit. Mac-it maintains a Fastener Engineering Service for the design, development and production of screws for all types of applications.

DISTRIBUTOR SERVICE

Hundreds of Mac-it distributors from coast to coast are ready to render immediate service in supplying your requirements for standard or special screw products.

MAC-IT SCREW DEPARTMENT
STRONG, CARLISLE & HAMMOND COMPANY
1392 W. 3RD. STREET • CLEVELAND 13, OHIO
Manufactured by Mac-it Parts Co., Lancaster, Pa.

Contact your nearest Mac-it distributor or the Home Office, Cleveland, Ohio, for the Mac-it Catalog No. 49 which contains full technical data.

SIGOURNEY

M-100
the PRECISION BENCH DRILLING MACHINE

SEND FOR ILLUSTRATED BULLETIN

No ordinary bench drilling machine, but an extremely accurate, high speed, sensitive machine for precision drilling. Drills from ¼" down to extremely small sizes. Successfully used down as far as .008".

Table and column exactly squared, one to the other, and built with strength and rigidity for maintained accuracy. Hardened and ground spindles insure long life. Sealed ball bearings throughout for smooth operation from 4,000 r.p.m. to 10,000 r.p.m. Motor, driving belt, and spindles entirely enclosed for safety. Available with 1, 2, 3 and 4 spindles.

THE SIGOURNEY TOOL CO.
HARTFORD 6, CONN.

Sole Sales Agent
PRATT & WHITNEY
Division Niles-Bement-Pond Co. --- West Hartford, Connecticut

. . . BIG PRESS FEATURES

IN PRESS-RITE 5 TON POWER PRESS

This heavy duty Press-Rite does all of these 5 Ton jobs hour after hour, day after day . . . fast and at low cost. A real production unit. Low price. *Write for bulletin today.*

SALES SERVICE MACHINE TOOL CO.
2347 University Ave., St. Paul 14, Minn.

LUERS

Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

THE KING PORTABLE BRINELL

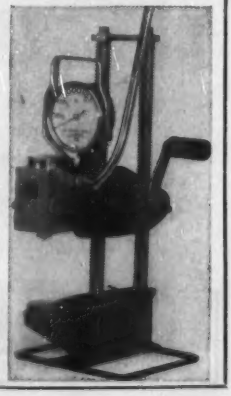
HARDNESS TESTERS for ALL Brinell Testing. Particularly adapted for use on Castings and Forgings.

Puts an actual load of 3000kg on a 10mm ball.
Throat, 4" deep.
Gap, 10" high.
Weight, 26 lbs.

Can be used in any position—even upside down.

Equally accurate as portable or stationary equipment.

Test head removable for testing larger pieces beyond the capacity of the standard base.



ANDREW KING
Box 606K, Ardmore, Pa.

NEW KENDEX* tooling slashes cost per cutting edge

It's entirely new . . . everything except the long-established Kendex "throwaway button" principle pioneered and proved by Kennametal.

We took a good look at tool cost per cutting edge and designed a new Kendex with a clamp-on, "turnover" insert, plus a new system of chip control. This combination eliminates all regrinding, doubles the usable cutting edges per insert, and slashes tool cost on all types of machining operations. For example: On one job, tool costs were cut from $1.13 to $0.06 per piece.

NEW "TURNOVER" INSERTS

The new "turnover" inserts are designed with cutting edges on both sides, and can be indexed in seconds. After all cutting edges are used on one side, simply turn them over and use an equal number on the reverse side. Square inserts have eight cutting edges; triangular inserts, six.

These cost-reducing inserts are available in two types: (1) Regular, ground on top and bottom with corner radii ground for indexing; (2) Precision inserts, ground on all sides for precision indexing. When all edges are used . . . replace the insert and eliminate regrinding.

The new Kendex comes in a range of sizes in two models—Standard and Heavy-Duty. The Standard model is available with either Regular or Precision inserts; the Heavy-Duty with Regular inserts only.

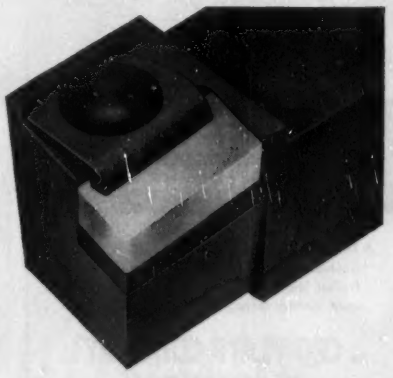
NEW CHIP CONTROL SYSTEM

The new Kendex design not only eliminates regrinding of inserts, but the grinding of chip breakers as well. Standard Kendex tools have replaceable carbide chip breakers which have the widest effective application of any mechanical chip breakers available. On many jobs, the chip breaker can be removed to prolong tool life. Heavy-Duty sizes (shown at right) are fitted with rigid, inexpensive spring clamps which serve as chip deflectors.

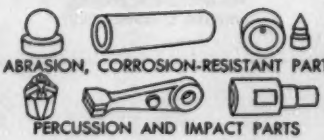
Replaceable, hardened steel shims (available on the larger shanks) prolong tool life, reduce tool maintenance, and eliminate grinding of holders in case of accident with the tool.

For complete information, call your Kennametal representative, or write KENNAMETAL, INC., Latrobe, Pennsylvania.

*Registered trademark



INDUSTRY AND
KENNAMETAL
. . . Partners in Progress

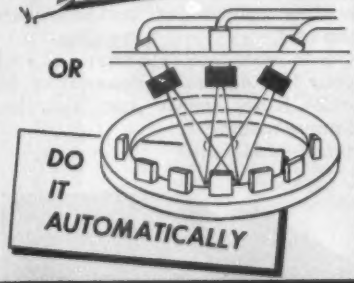


which of these
DEBURRING PROBLEMS
are yours?

CHECK*

- ☐ Machining slivers
- ☐ Feather edges
- ☐ True burrs
- ☐ Low drilling crowns
- ☐ Associated chips
- ☐ Light extruded metal
- ☐ Tool fuzz
- ☐ Gear teeth
- ☐ Deep holes
- ☐ Spirals
- ☐ Recesses
- ☐ Slots
- ☐ Threads

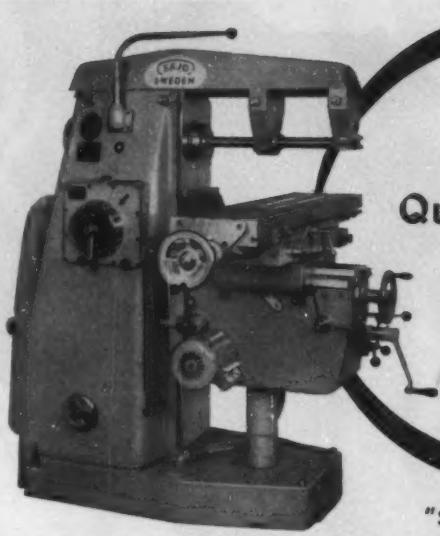
OR



WITH **PRESSURE BLAST**
WET BLASTING
TWO SPEED

This ad is your coupon. Check off your problem(s) and mail today for free illustrated literature . . . application data . . . case history information!

THE CRO-PLATE COMPANY INC.
747-A WINDSOR STREET
HARTFORD 3, CONNECTICUT



Quality pays off

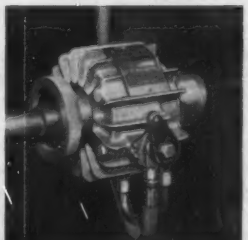
SAJO *in operation tells its own story**

"SAJO" and "Quality" are synonymous. The high standards and painstaking Swedish craftsmanship on which the SAJO reputation has been established are faithfully maintained in all SAJO Milling Machines. They are built to assure the accuracy and dependability which mean profitable operation—and their cost is surprisingly low. Available in 3 models!

Model 54 (illustrated) a full No. 2 capacity ALL-GEARED Miller—Plain or Universal types—with 5 HP main drive motor and 1½ HP table feed motor; #50 NMT spindle; 16 spindle speeds up to 1500 RPM; single lever speed and feed selectors with direct reading dials; single lever control for START-STOP-BRAKE; table power feed and POWER RAPID TRAVERSE in 3 directions. Model 53 Light Duty No. 2 ALL-GEARED Miller. Model 48 Light Duty No. 2 Utility Miller.

**Ask for references*

austin industrial corp.
76-F MAMARONECK AVE., WHITE PLAINS, N.Y.
Look for the Austin Seal—your full guarantee of satisfaction.



STEP UP PRODUCTION 20% +
. . . for most lathes to 1" bar stock capacity

- Hold delicate parts without damage or adjustment
- Iron grip for heavy work
- No adjusting for stock or part variations
- Finger-tip or foot control eliminates operator fatigue
- Eliminates jarring of head stock

(Ten day FREE TRIAL to reliable firms)

WILSON AIR COLLET CLOSER, INC.
909 40th Ave. NE, Minneapolis 21, Minn.

LAYOUT FLUID
FOR ANY METAL

Scribed lines are easy to see against the dark blue background. Speeds up layout work and cuts costs. Merely wipe surface clean and brush on layout fluid. *Dries instantly.* Write on your company letterhead for free sample. Advise us if your local supply house doesn't carry.

DAYTON ROGERS
Manufacturing Company
Minneapolis 7, Minnesota

Example of a permanent mould casting of a crankcase for a 49 c.c. 2-stroke engine

Hiduminium

makes the most of *Aluminium*

HIGH DUTY ALLOYS LTD., AGENTS: RUSSELL ASSOCIATES INCORPORATED

165 ORINOCO DRIVE, BRIGHTWATERS, L.I., N.Y.

Multi-Purpose Wonder Grip Vises

Tested for Performance to High American Standards

Immediate Delivery from New York Stock

MADE IN GERMANY

Low Competitive Prices

HORIZONTAL & VERTICAL SWIVEL TYPE

HORIZONTAL SWIVEL TYPE

MBI

4 STEPPED JAWS PERMIT CLAMPING of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Easy and quick to mount and align on any machine. Holds rigid in any position without vibration. Various capacities and extra soft jaws available.

- Tapping Attachments
- Quick Change Chucks & Collets
- Wille-Grip Keyless Drill Chucks
- Milling Machine Arbors, Adapters, Arbor Spacers & Bearings
- Lathe Mandrels

Distributor & Sales Representative Inquiries Invited

Also United States Distributors of European Machine Tools

Write for complete details and prices to Dept. 20

M. B. I.

EXPORT & IMPORT LTD.

A Division of Machinery Builders Inc

Over 20 years experience in designing & building machinery

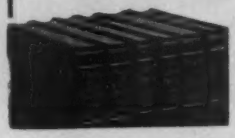
475 Grand Concourse, Bronx 51, N. Y.

CABLE ADDRESS: Machbuild New York

Phone: MOtt Haven 5-0900

Our headquarters in New York City

Now! Take home MORE PAY...step into a better job!



These books give you the facts needed to become a MASTER MACHINIST

HIGH-PAYING machinists' jobs are waiting for men who can handle them. Here's a sound guide that helps YOU fit into any one of these jobs. It gives you the practical knowledge of machine shop work that enables you to handle all kinds of jobs efficiently. You'll face work with confidence . . . plan and carry it out with better results . . . you'll see advancements and better pay come your way.

Shops throughout the country use this library. It answers questions on methods . . . tells what you need to know about the operation and repair of all types and sizes of machines for the whole range of metal cutting, forming and finishing operations.

The Modernized AMERICAN MACHINISTS' LIBRARY

2987 pages, over 2900 illus. Scores of charts and tables

6 VOLUMES

1. Turning and Boring, 3rd Edition
2. Drilling and Surfacing Practice, 3rd Edition
3. Grinding Practice, 3rd Edition
4. Gear Cutting Practice, 3rd Edition
5. Punches and Dies, 4th Edition
6. Jigs and Fixtures, 5th Edition

HERE'S the gist of more machine shop experience than one man could amass in a lifetime of work . . . written by experts and made available in 6 compact volumes. You can check on your own methods, keep abreast of modern practices, solve problems right on the spot as they come up.

Guides You on All Types of Jobs. With this guide, no job is too hard or unusual. The AMERICAN MACHINISTS' LIBRARY is so clearly and thoroughly indexed that you find in a jiffy answers to whatever problems may arise. With charts, diagrams, and pictures you're shown where to look for trouble . . . the characteristics . . . how to repair it . . . and the steps to take in order to keep machines operating smoothly and at top efficiency.

What this Library gives you:—complete guide for everybody, from shop executive to apprentice interested in the operation of machines — descriptions of all important varieties of machines, both manual and automatic, and methods of operating them—essentials of selecting machines, setting up work, and handling operations in reaming, tapping, planning, shaping slotting milling and broaching etc. etc.

NO MONEY DOWN
EASY PAYMENTS
6 MONTHS TO PAY

SEE THESE BOOKS 10 DAYS FREE

McGraw-Hill Book Co., Inc., Dept. AM-11-22
330 W. 42 St., NYC 36

Send me the AMERICAN MACHINISTS' LIBRARY, 6 volumes, charges prepaid, for 10 days' examination. If I find the books satisfactory, I will send you $4.50 in 10 days and $7.00 a month until a total of $32.50 has been paid. Otherwise, I will return the books.

Name .....

Address .....

City ..... Zone..... State.....

Company .....

Position .....

For price and terms outside U.S. write McGraw-Hill Int'l., N.Y.C

AM-11-22

BUZZER

Reg. U. S. Pat. Off.

INDUSTRIAL *GAS* EQUIPMENT

NO BLOWER OR OTHER POWER NEEDED

JUST CONNECT TO GAS SUPPLY

BUZZER Equipment, a buy-word since 1911, provides the hottest and quickest heating . . . without blower or power. Wide range of turn down and heat control. You can depend on a BUZZER.

Ring Burners

Pipe Burners

Nozzle Burners

Mfrs. since 1911

Send for complete BUZZER Catalog

CHARLES A. HONES, Inc.

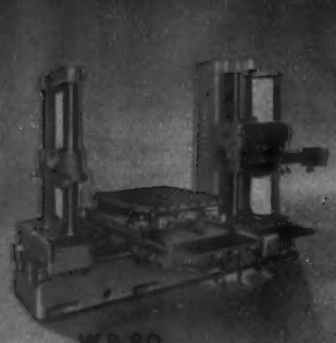
126 SO. GRAND AVE., BALDWIN, L. I., N. Y.

BURNERS - FURNACES (Heat Treating, Melting, Soldering)

SCHARMANN

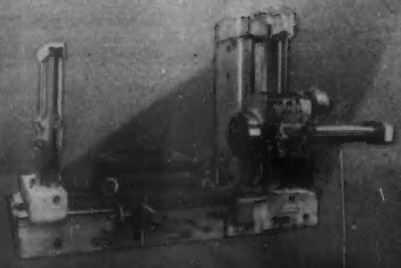
HORIZONTAL BORING MACHINES

TABLE TYPES · FLOOR TYPES · PORTABLE TYPES

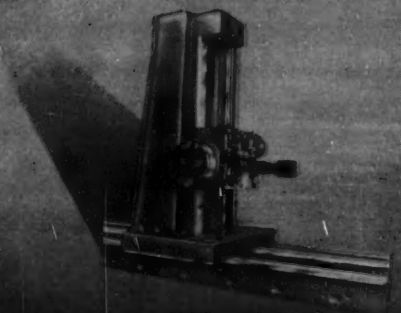


WB 80

FB 63



WB 100



SCHARMANN MACHINE CORPORATION

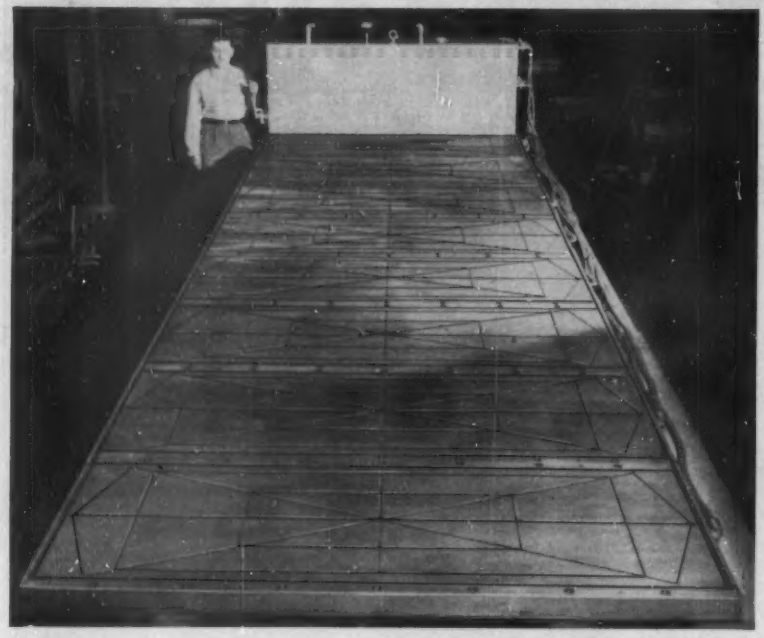
337 BOULEVARD OF THE ALLIES · PITTSBURGH 22, PENNSYLVANIA

TELEPHONE: ATLANTIC 1-6336 · CABLE ADDRESS: SCHARMANN PITTSBURGH

IN THE DOMINION OF CANADA A. R. WILLIAMS MACHINERY COMPANY, LTD.

64 FRONT STREET WEST, TORONTO

Walker Does It Again-



Walker. pioneer in the chuck industry, has been utilizing magnetic force to make all types of special and standard chucks since 1887.

Walker now harnesses atmospheric force for special vacuum chucks to hold non-magnetic materials. First a leader in magnetic force—now a pioneer in atmospheric force.

Hold Everything with Walker Chucks

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

Original Designers and Builders of Magnetic Chucks

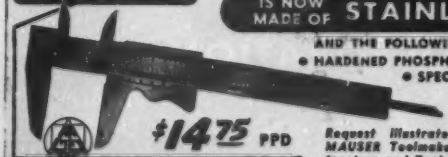
IMPORTANT NOTICE

The Genuine (MAUSER) **VERNIER CALIPER**

IS NOW MADE OF **STAINLESS STEEL** THROUGHOUT

AND THE FOLLOWING IMPROVEMENTS HAVE BEEN ADDED

- HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy
- SPECIALLY LONG VERNIER to read thousandths
- 3 GRADUATIONS - 1/1000" - 1/128" 1/10 mm in back



$14.75 PPD

Request illustrated folder showing complete line of MAUSER Toolmakers Calipers, Height Gages, Bevel Protractors and Tool Stands.

GEORGE SCHERR CO., Inc.

200 AM Lafayette St., New York 12, N. Y.

How to Control SHOP COSTS

Skillful control of all operations involved in developing, manufacturing, and marketing the products of your company bears strongly on your company's profit situation.

This *American Machinist* Special Report describes methods of controlling manufacturing costs that can be applied in jobbing as well as production shops. Basic concepts of common costing methods are examined, and emphasis is given the fundamentals upon which all systems must be based to produce accurate operating figures.

Numerous graphs, charts, and reproductions of the many operating reports required add to the helpfulness of this fifteen-page report by Albert E. Grover, Cost Consultant.

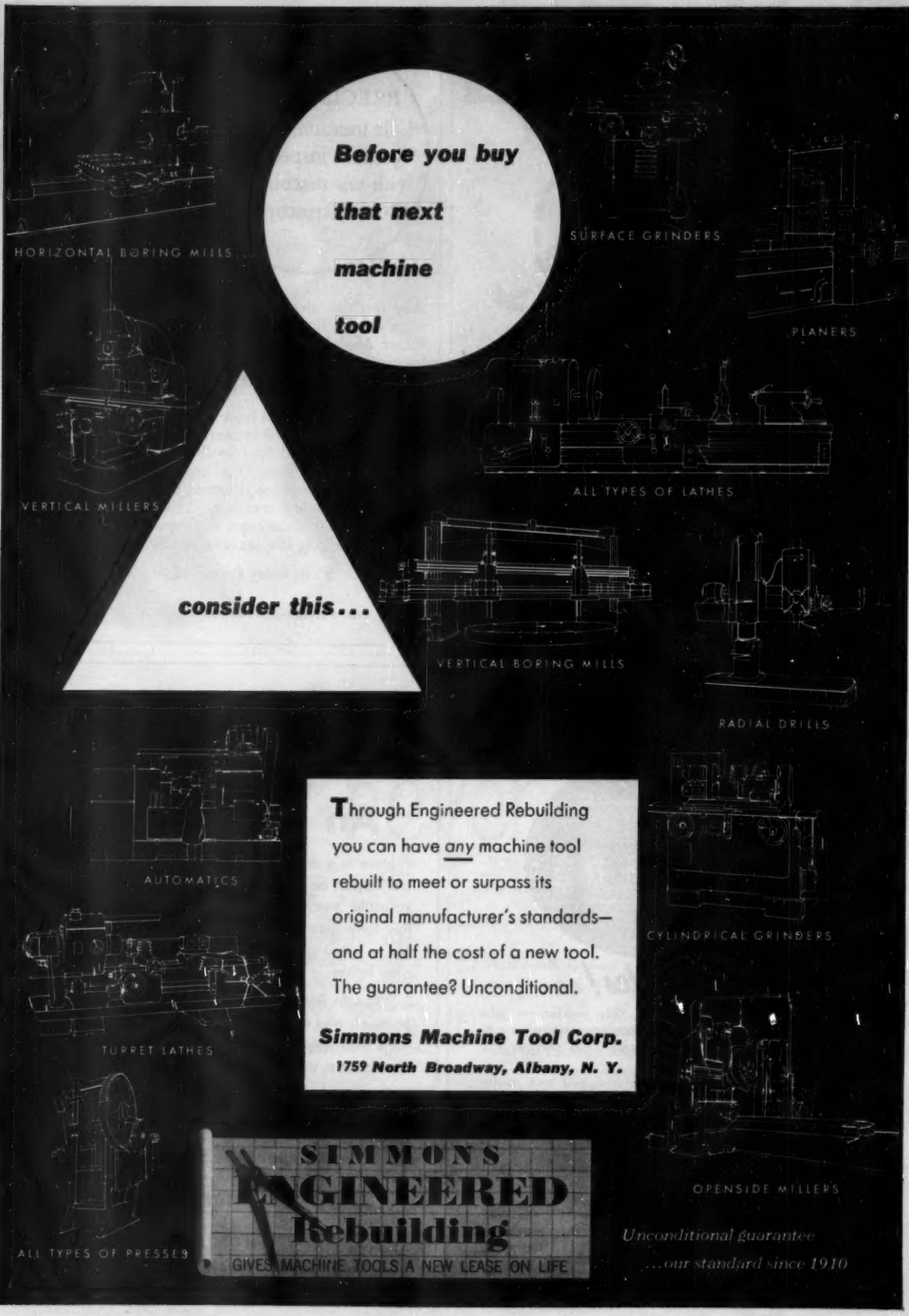
25 cents a copy

Reader Service Department

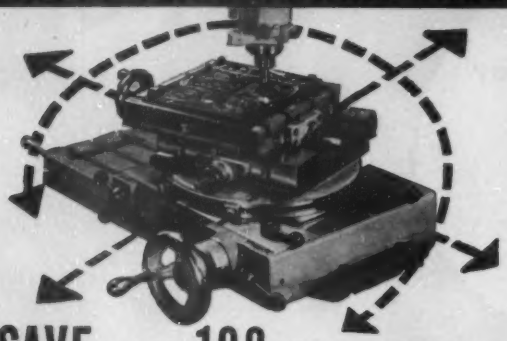
American Machinist

McGraw-Hill Building

New York 36, N.Y.


Before you buy that next machine tool
HORIZONTAL BORING MILLS
SURFACE GRINDERS
PLANERS
VERTICAL MILLERS
ALL TYPES OF LATHES
consider this...
VERTICAL BORING MILLS
RADIAL DRILLS
AUTOMATICS
CYLINDRICAL GRINDERS
TURRET LATHES
OPENSIDE MILLERS
ALL TYPES OF PRESSES
Through Engineered Rebuilding you can have any machine tool rebuilt to meet or surpass its original manufacturer's standards—and at half the cost of a new tool. The guarantee? Unconditional.
Simmons Machine Tool Corp.
1759 North Broadway, Albany, N. Y.
SIMMONS
ENGINEERED
Rebuilding
GIVES MACHINE TOOLS A NEW LEASE ON LIFE
Unconditional guarantee
...our standard since 1910

ADVANCE
CROSS-SLIDE ROTARY TABLE



SAVE up to 198 Hours or More
set-up and machining time*

on Stamping Dies, Cams, Templates, Forging Dies, Patterns, Die Cast Dies, Rubber molds, Tools, Plastic molds, Jigs, Gauges, Fixtures, Models, Experimental work, Boring and Grinding jobs, Short-run production!

FITS MOST STANDARD VERTICAL MILLING MACHINES

*Proved by our customers! Hours saved in comparison with time needed to do job on standard vertical milling machines not equipped with table.

WRITE FOR SPECIFICATIONS and literature showing typical jobs.

ADVANCE PRODUCTS / BENTON HARBOR, MICHIGAN

PRECISE
hole location, easy
contour inspection
with *new* machine
tool microscope

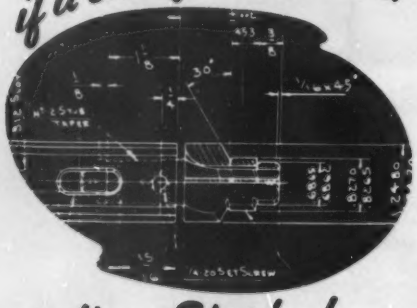
Any machine shop, large or small, can save time and money on milling and boring work with the new Perkin-Elmer Model 11 Machine Tool Microscope. For hole location, its wide field of view (¼") or 30x magnification makes it possible to gage accurately to a ten thousandth—*at a glance.*

Mount the Model 11 on an offset bracket or directly in the spindle—it will fit nearly any machine tool. When offset it can be used for transferring hole locations from template to workpiece. The image always appears erect and moves in the same direction as the work, making it ideal for checking contours, slots, surface conditions. The Model 11 Microscope is compact, sturdy, rugged—designed for long life, accurate service.

Write today for complete details.

THE PERKIN-ELMER CORPORATION, NORWALK, CONN.

if it calls for Specials...



call on Staples!

Turn troublesome, costly "special" hole production jobs into smooth-running, high-performance operations by taking your problems to Staples Special Tool Design and Engineering Service.

Leaders in the field of circular carbide-tipped tool manufacturing, Staples' expert tool engineers can meet your most rigid specifications with special tool designs that will speed your production and deliver precision results, while reducing your tooling costs.

A brief description of your job requirements will bring a prompt response.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Standard Circular Carbide-Tipped Tools, Expansion Reamers

All about

How to Run An Engine Lathe

Here is a comprehensive *American Machinist* Special Report on one of Metalworking's most useful and versatile machines. Production executives will find this fully illustrated report particularly useful as an aid in training apprentices and new operators of engine lathes.

"How to Run an Engine Lathe" covers in detail the parts of, and operation of, the engine lathe. Turning tools and the various turning operations, plus lathe attachments and care, are examined at some length.

Copies of this valuable Special Report are available to you at 25 cents each.

16 pages — 25 cents each

READER SERVICE DEPARTMENT

American Machinist

330 West 42nd Street, New York 36, N. Y.

FAMOUS LAST WORDS:

"it may never happen"

True—and let's hope it never does. But the moment when we're least expecting it would be the best moment for an aggressor to attack. And the atom bomb isn't the only emergency that may hit us. Fires, floods, explosions, tornadoes also strike with little or no warning. Be ready for disaster, whatever form it takes. Do these simple things TODAY:

- ☐ **Enlist the help of your local Civil Defense Director.**
- ☐ **Check contents and locations of first-aid kits.**
- ☐ **Send staff to Red Cross courses. They may save your life.**
- ☐ **Promote preparedness in your community. Your local CD Director can show you how.**

Set the standard of preparedness in your plant city—check off these four simple points NOW.

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE

$1.50 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

BOX NUMBERS count 1 line additional.

POSITION WANTED undisplayed rate is one-half of above, payable in advance.

PROPOSALS $1.50 a line an insertion.

INFORMATION

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

EQUIPMENT WANTED OF FOR SALE Advertisements acceptable only in Displayed Style.

DISPLAYED RATE

The advertising rate is $12.60 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page. A. M.

NEW ADVERTISEMENTS: Address N.Y. Office, 330 W. 42 St., N.Y. 36, N.Y., for December 6th issue closing November 22nd.

ASSISTANT SALES MANAGER

Young and progressive. Machine Tool builder requires an assistant sales manager. Excellent opportunity for proper man. Please write, furnishing us with your complete background, age and salary requirements. Replies are kept in complete confidence.

P-4497, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

MACHINE TOOL MANUFACTURERS REPRESENTATIVES

who call on machinery dealers and industrial supply jobbers. Who sell 16" drill presses, all models; bench grinders, coliant pumps and dust collectors. Advise territory with references.

UNIVERSAL GEAR WORKS, INC.
1301 East McNichols Road, Detroit 3, Mich.

CONTRACT WORK

T-slot Bolts

The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Write for prices.

THE OK TOOL COMPANY
MILFORD 2, NEW HAMPSHIRE

BLANCHARD GRINDING

Have two (2) Grinders #18, with 36" and 42" Chucks. Send drawings for quotation.

CHOWNING REGULATOR CORP.
CORNING, N. Y.

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them.

GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

SALES EXECUTIVE
IN THE NEW ENGLAND AREA

Looking for five to ten industrial supply items such as Milling Cutters, Carbide Tools, Drills etc. to sell in the New England area. Results guaranteed. For further information contact:

JAMES DOAK, LOW LANE, BRISTOL, R. I.

MACHINE TOOL RECONDITIONING & the Art of Hand Scraping
— illustrated —
Write today for folder describing book
MACHINE TOOL PUBLICATIONS
215 Commerce Bldg., Fourth & Wabasha Sts.
St. Paul 1, Minn.

PEACOCK CORPORATION
Propane Gas Installations
and
Anhydrous Ammonia Plants
Paul E. Peacock, Jr., Pres.
Box 268 Westfield, N. J. Westfield 2-6258

SAMSON
BUYS SELLS
STANDARD OR SPECIAL MACHINERY AND EQUIPMENT
FUNDS AVAILABLE
FOR PURCHASE OF SINGLE MACHINES OR COMPLETE PLANTS
SAMSON MACHINERY CO.
9A South Clinton St., Chicago 6, Ill.
Room 628A Phone CENTRAL 6-3229

WANT TO BUY

One 12" 8-spindle, type "D" Bullard "Mult-Au-Matic" arranged for double index, with at least 2 double purpose heads and 2 compound heads.

Contact Louis Wozar or Kenneth Lung

THE DAYTON PUMP & MFG. CO.
Dayton 1, Ohio Phone: MI-9871

WANTED AIRCRAFT MATERIAL
Surplus or Termination Inventories
Hardware—Electrical, or Components
Also Raw Stock, Rod and Bar
Stainless, Aluminum, Steel, Brass
Send lists for cash offer to:
COLLINS ENGINEERING COMPANY
9050 Washington Blvd., Culver City, Calif.

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42 St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

SELLING OPPORTUNITY OFFERED

MANUFACTURERS REPRESENTATIVE To represent manufacturer of new type spiral carbide cutting tools. Outstanding opportunity for good man. Commission only. Choice territories open. RW-4606, American Machinist.

---

this Searchlight Section of

American Machinist

is an index of reliable sources for Used and Surplus Equipment Supplies now available. Consult the *Searchlight Section* in following issues for later offerings.

If you don't see what you want—ask for it. Ask the advertisers. They are constantly adding to their stocks and may have acquired just what you need.

And, when you have special items to dispose of, use the Searchlight Section of American Machinist to help you locate buyers. . . . Send a list of your equipment and we will gladly give information as to space and rates.

Classified Advertising Division

American Machinist

330 W. 42nd St., New York 36, N. Y.

Eastern Rebuilt Machine Tools

THE SIGN OF QUALITY — THE MARK OF DEPENDABILITY

MAIN WAREHOUSE BAY IN EASTERN'S 11 ACRE CINCINNATI PLANT — THE LARGEST MACHINE TOOL PLANT IN THE U.S.A. DEVOTED EXCLUSIVELY TO REBUILT MACHINERY.

HAND MILLING MACHINES

No. 1 U.S. m.d.
Van Norman, m.d., latest

PLAIN MILLING MACHINES

No. 1B Milwaukee, m.d.
No. 1½ Brown & Sharpe, Plain, cone, motorized
No. 2 Rockford, m.d.
No. 4 Ohio, cone
No. 3 Standard Plain Type Milwaukee, m.d.
No. 3S Van Norman, m.d.
No. 3B Milwaukee, m.d.
No. 3B Brown & Sharpe, m.d.
No. 3S Van Norman Plain Miller
No. 5 Cincinnati High Power Dial Type, m.d., late

THREAD MILLING MACHINES

14"x16" U6 Automatic Hob, m.d.
Hall Planetary, m.d.
6x14", 6x20" Pratt & Whitney
10x24" Hanson Whitney, m.d., latest
No. 40 Lees-Bradner Auto. Universal, m.d., late Model LT Lees-Bradner, with collet attachment

UNIVERSAL MILLING MACHINES

No. 2 Denbigh, m.d., brand new
No. 2BS Milwaukee, m.d.
No. 4A Brown & Sharpe, m.d.

MANUFACTURING TYPE MILLING MACHINES

Taylor & Fenn 2 spindle Spline Miller, m.d.
No. 00 Sundstrand Hydraulic Rigidmill, m.d.
No. 3A Sundstrand Copy Rigidmill, m.d.
No. 1S Sundstrand, m.d.
No. MM-1-6 U.S. MultiMiller, m.d.
4" Pratt & Whitney Spline Miller, m.d.
10", 24" Cincinnati Plain Automatic, m.d.
24" Cincinnati Duplex Automatic, m.d.
24" Garvin Cam or Form Milling Machine, m.d.
No. 21 Brown & Sharpe Automatic, m.d.
48"x16' Newton Slab Miller, m.d.
54"x30"x16' Ingersoll Slab Miller, m.d.
No. 3 Niles Cutter & Keyseat Milling Machine, m.d.
No. 3-30 Cincinnati Duplex Hydraulic Miller, m.d. in base
M60 Taylor & Fenn Duplex Spline Miller, m.d., latest type

VERTICAL MILLING MACHINES

No. 1S Sundstrand, m.d.
No. 1-14 Kent Owens, m.d.
No. 00 Cincinnati, m.d., latest
Newton Vertical Miller, rotary table
54" Ingersoll Single Spindle Adjustable Rotary Mill, m.d.
54" Ingersoll two spindle rotary Mill, m.d.
No. 4 Cincinnati Vertical High Power, m.d., Timken
4 spindle 360 degree Cincinnati Automatic Profiling Machine, m.d.
No. 4 Cincinnati Medium Speed Dial Type Miller, m.d.

MILLING MACHINE ATTACHMENTS

16" Cincinnati Circular Milling Table, p.f.
16" Kearney & Trecker Rotary Table, p.f.
20" Cincinnati Power Feed Rotary Table
Kearney & Trecker Attach. for Milling Bridge Roamers, 62" long x 24" wide
1½" Cincinnati Rack Milling Attach. for No. 3 Dial Type Miller
Vertical Attachment for Milwaukee Mfg. Type Miller
Rack Cutting Attach. for No. 4 Cincinnati H.P. Rect. Overarm Miller
Brown & Sharpe Vertical Attachment
Cincinnati Universal Vertical Milling Attachment for No. 5 Miller

PLANERS

P10 Coulter Crank Type Shaper-Planer, 1 head, m.d.
20"x20"x5' Whitcomb-Blaisdell Planer, 1 head, m.d.
24"x24"x6' G. A. Gray Planer, belted m.d., 1 head on cross rail
30"x30"x8' Cincinnati, belted m.d., 2 rail heads
30"x30"x10' Cincinnati, belted m.d., 2 heads
30"x30"x10' G. A. Gray, m.d., late
36"x36"x8' Cincinnati, m.d., 2 heads on rail
36"x36"x10' Betts, belted m.d., 2 heads on rail, 2 side heads
36"x36"x10' Gray, Extra Heavy Pattern, m.d., 2 heads on rail
36"x36"x10' Niles-Bement-Pond, belted m.d., 1 head on cross rail
36"x36"x12' Betts, m.d., 2 heads
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x20' G. A. Gray, 2 heads, belt
36" widened to 42"x36"x20' Cincinnati, m.d., 2 rail heads, 1 side head
42"x42"x26' G. A. Gray, 2 heads, belted m.d.
48"x48"x18' Niles-Bement-Pond, 2 heads, belt
48"x48"x18' Detrick & Harvey, 4 heads, reversing m.d.
48"x48"x28' Cincinnati, reversing m.d., 4 heads
56"x42"x14' Cincinnati, belted m.d., 2 heads

RAILROAD MACHINERY

No. 2 Niles-Bement-Pond Axle Lathe, m.d.
No. 3 Niles-Bement-Pond Axle Lathe, m.d.
48" Niles-Bement-Pond Car Wheel Borer, m.d.
90" Niles Balanced Quartering & Crank Pin Turning Machine, latest
90" Putnam Driving Wheel Lathe, m.d.
90" Niles Journal Lathe, including 2 inside journal turrets and 3½" spindle double quartering attachment, m.d.
90" Niles Driving Wheel Lathe, m.d., latest
Niles-Bement-Pond Quartering Machine, m.d., new

ABOVE ONLY A PARTIAL LISTING
SEND FOR COMPLETE STOCK LIST

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS
EMCO

AMERICA'S LARGEST STOCK
USED – REBUILT MACHINE TOOLS

1000 LATE TYPE TOOLS IN STOCK

AUTOMATIC SCREW MACHINES
ACME GRIDLEY R6, 1¾", 6-spindle; late type
ACME GRIDLEY RB, 1¾", 6-spindle; late type
CONOMATIC 1⅞", 6-spindle; M.D., late type
CLEVELAND 3½", Model "A" Single spindle late
CLEVELAND 6", Model "A", single spindle; late
NEW BRITAIN GRIDLEY Model 665; 6-spindle shucker; latest type; new 1943.

BORING MILLS—Horizontal
NILES 6" bar; floor type; motor drive
HEALD 46B, 47A and 48A single end Borematic; M.D., late type
HEALD No. 49 double end Borematic; M.D.

BORING MILLS—Vertical
BULLARD 8", 6-spindle & 16" 6-spindle Type "D" Mult-au-matic; late type
BULLARD 24" & 54" spiral drive, M.D., late type
NILES 52", 2 swivel heads, PRT; M.D.
NILES 100" 2 swivel heads, PRT; M.D.
SELLERS 144", 2 swivel heads on cross rail; PRT

BROACHES
CINCINNATI 1-20 Duplex Vertical cap. 1 ton 30" stroke; Hydraulic; late
COLONIAL VG1-10-48 Vertical; Hydraulic; late
LAPOINTE 10-54" Vertical, Model SRV; new 1947
OILGEAR 3XA horizontal; cap. 20,000 lb; 56" stroke; hydraulic; late type
OILGEAR type XL-6 single ram; late type.

DRILLS—Radial
AMERICAN 4' arm 11" col. "Hole Wizard", late
AMERICAN 5' arm 11" col. "Hole Wizard", late
AMERICAN 5' arm 13" col. "Hole Wizard", late

DRILLS—Manufacturing
BARNES #262 Heavy Duty Camel Back; late type
BARNES #-2 Hudram; 2" cap.; 22" swing; hydraulic; late type
NATCO B-4-B "Hole Steel" 60 adj. slip spindles; late type
NATCO B-3-B "Hole Steel" 12 adj. spindles; late
NATCO C-5 and E-5 high speed, 10 adj. spindles; late type

FELLOWS GEAR EQUIPMENT
FELLOWS No. 6 High Speed Gear Shaper; late
FELLOWS No. 46 High Speed Gear Shaper; internal cap. 72" diameter; late
FELLOWS No. 61A & 615A High Speed Gear Shaper; late
FELLOWS No. 6Z2 High Speed Gear Shaper; late
FELLOWS No. 7A and No. 75 High Speed Gear shaper; late type
FELLOWS No. 13 LS Lapper; motor drive, late

GLEASON GEAR EQUIPMENT
GLEASON 3" Spiral Gear Generator; late
GLEASON No. 4 Tester; late type
GLEASON No. 7 Hyp. Cutter Sharp; latest type
GLEASON No. 12 Tool Sharpener; motor drive
GLEASON No. 13 Hyp. Cutter Sharpener; late
GLEASON 12" Spiral Bev. Cutter Sharpener; M.D.
GLEASON 12" Straight Bevel Generator; late
GLEASON No. 14 Spiral Bevel Hyp. Gear Grinder
GLEASON No. 17 Spiral Bevel, Zerol and Hypoid Gear Grinder, M.D., late
GLEASON No. 18 Gear Tester and Lapper; M.D.
GLEASON No 20 Gear Tester; latest type
GLEASON #22 Hypoid Formate Gear Finisher; late
GLEASON 25" Straight Bevel Gear Gen.; M.D.
GLEASON 24" and 37" Bevel Gear Planer; M.D.
GLEASON 25" Spiral Bevel Gear Gen.; M.D.
GLEASON No. 6 Revacycle 5" cone distance; late

GRINDERS, Cyl. Plain & Univ.
CINCINNATI 14"x72" Universal; M.D., late type
CINCINNATI 6"x18" Model ER Plain, "Filmatic"; late type
LANDIS 10"x18" type C Plain, Hydraulic, late
LANDIS 14"x36" type DC plain hydr. with infeed; late
NORTON 4"x12" Model CTU Plain, year 1953
NORTON 6"x16" Type "C" Plain; late type
NORTON 10"x72" type "C" Plain; late type

GRINDERS, Surface
ABRASIVE #34, 6"x24" table; late type
HEALD #22 Rotary, 12" chuck; M.D., late

LATHES, Turret
GISHOLT #1L and #2L Saddle type; Timken; late
GISHOLT #3 Universal ram type; M.D., late
LIBBY #4H, 12" hole, motor drive, late type
MOREY #2, #3, #4 ram type; Timken; latest type
WARNER & SWASEY #1-A Universal; Hex., late
WARNER & SWASEY #2 Geared Head; late
WARNER & SWASEY #3 and #5 Univ. ram type, late type

LATHES, Engine & Mfc.
HENDEY 24"x30" centers; motor drive; late type
LeBLOND 42"x108" centers, Timken; M.D., late type
LODGE & SHIPLEY 12"x30" centers, Toolroom
LODGE & SHIPLEY 14"x30" centers; late type
MONARCH Model EE 10"x20" centers, Toolroom; late
MONARCH 12"x30" centers; Model CKK; late type
NILES 30"x50" bed, single end boring, "Time Saver"
NILES 36"x100" centers "Time Saver"; motor drive; late type
PRATT & WHITNEY 16"x30" centers; Timken, late
SUNDSTRAND 10"x60" centers; auto Type B; late

MILLING MACHINES, Plain
BROWN & SHARPE #2 M.D. late type
CINCINNATI 1-18 Production; Timken; late type
KEARNEY & TRECKER 2H, 2HL, & 4H, M.D., late

MILLING MACHINES, Thread
HALL Style "D" Planetary; late type
LEES BRADNER Model #LT 6"x30" #HT 12"x24" and #HT 12"x36" centers; late type
MOREY 12"x30" and 12"x100" centers; late type

MILLING MACHINES, Universal
CINCINNATI 2MH Univ., motor drive, late type
CINCINNATI #3 Dial Type, Timken, M.D., late
KEARNEY & TRECKER #3K; Timken; late type
VAN NORMAN #22L, #26 and #36 ram type; late

MILLING MACHINES, Vertical
CINCINNATI #4 High Speed Dial type; late
CINCINNATI 0-8 Vertical; Timken; late type
CINCINNATI #3 Dial Type; High Speed, New 1953
KEARNEY & TRECKER #3H and #4H late type

PLANERS
GRAY 35"x36"x10' "Maximum Service" 4 hds; PRT; DC; Reversing
GRAY 48"x48"x10' "Maximum Service" 4 hds; PRT; DC; Reversing
LIBERTY 144"x76"x48" adj. openside; box table; 4 hds; vari-voltage; PRT; New 1948
NILES-BEMENT-POND 72"x72"x30"; 4 hds; PRT; DC; M.D.

PRESSES
BLISS #410A, 525-ton double action toggle drawing press; M.D.
NATIONAL #5 "Maxi-Prese", 1000-ton cap. H.B. Forging Machine; M.D.
SHAW 250-ton Hydraulic flanging press; late
WATERBURY FARREL #9, 125-ton cap., M.D.

SHAPERS
ROCKFORD 24", hydraulic motor drive; late type.
CINCINNATI 16"; motor drive; hydraulic, late type
GOULD & EBERHARDT 32"; High Speed; motor drive; late type
MOREY 8" Vertical; motor drive; late type

MISCELLANEOUS
ALEXANDER #2, 3-dim. Engraving NEW 1952
BARNES No. 172 Honing; M.D., hydr.; late
HILLES & JONES #7 Plate Bending Roll; capacity ⅞" x 16"; motor drive
LeBLOND No. 2 Deep Hole Reaming, late type
LeBLOND No. 2 Deep Hole Rifling, late type
MANVILLE No. 3 Bolt Head Trimmer, M.D.
MANVILLE 2C Screw Slotter, Motor Drive
MANVILLE No. 1 Screw Slotter, Motor Drive
HUGH SMITH cap. 1" thick plate x 25' between housings-Plate Bend. Roll, M.D.

Complete Catalog on request

MOREY MACHINERY CO., INC.
MANUFACTURERS • MERCHANTS • DISTRIBUTORS of MACH. TOOLS
307 LAFAYETTE ST. NEW YORK 3, N.Y.
TELEPHONE ALGONQUIN 4-3500 CABLE WOODWORK

Machine Tool Dollar Savers!

AUTOMATIC SCREW MACHINES
Conomatics from 2¼" to 4½" Four-Spindle—MD
Brown & Sharpe #00 High Speed—Cap. 5/16"—Misc. collets and change gears—MD through Turner Drive
Brown & Sharpe #00G High Speed—Cap. 5/16"—Screw slotting attachment—Misc. change gears—Misc. tooling—MD
Brown & Sharpe #00G High Speed—Cap. ½"—Screw slotting attachment—Misc. collets and change gears—Tool posts—MD
Brown & Sharpe #2 High Speed—Cap. ⅞"—Misc. collets and change gears—MD through Turner Drive

TURRET LATHES
Warner & Swasey #2 Geared Head Ram Type Model M-1330—Cap. 1" round—Electric or mechanical bar feed models—MD
Warner & Swasey #3 Universal—Cap. 1½" round—Bar feed—MD
Warner & Swasey #5 Pressletor Head Universal—Chucking—MD—Late
Warner & Swasey #1A Pressletor Head Universal Model M-470—Cap. 2½"—Bar feed—MD—Late
Warner & Swasey #3A Saddle Type Universal—Model M-350—Cap. 4½" round—Bar feed—Tooling—MD

PLAIN MILLERS
Brown & Sharpe #2 Light Type—Range 26"x10"x 15"—Flange type MD—Late
Cincinnati #2L Rectangular Overarm—Range 29"x 10"x17"—Speeds to 1200 RPM—MD
Cincinnati #2M Rectangular Overarm—Range 28"x 10"x19"—MD
Van Norman #26—Range 28"x12"x19"—MD—Late

MISCELLANEOUS
Pratt & Whitney Single Spindle Three-Dimensional Automatic Duplicator, Type 1736—MD—1952 machine
DeAll Model V-26 and V-36 Contour Shaping Machines—Throats 26" and 36" respectively—Max. work thickness cap. 12" and 10"—MD—1944 and 1945 machines
Campbell #401 Abrasive Cut-Off Machine—Cap. 6" dia.—MD—Rebuilt

This is only a partial listing of our huge stock of Machine Tools of every Make and Description.

May we add your name to our mailing list?

America's Foremost Machine Tool Rebuilders

Botwinik Brothers of Mass. Inc.
3 SHERMAN ST., WORCESTER, MASS.

Serving the World's Largest Manufacturers

NEW - USED REBUILT MACHINERY

#2 Cincinnati Plain Horiz. Miller Dial Type, High Speed
8" Niles Bement Pond Boring Mill Serial #17755
3'9" MORRIS MOR-SPEED RADIAL DRILL
20"x10' Bed L&S Model E Sa-
lective Head Engine Lathe —Serial #29286
No. 47 Head Single End Borematic—Serial #4646
22"-44"x80" Bed Putnam Sliding Bed Gap Lathe

MONA

HAZARD BROWNELL MACHINE TOOLS INC.
350 WATERMAN STREET PROVIDENCE 6, R. I. DEXTER 1-8880

RARE MILLING MACHINES

CSM MILWAUKEE

1—#3 Plain 30 H.P. New 1947
1—#2 Vert. 20 H.P. New 1950 with Climb Milling, Auto. Cycle, High Speed

Many Other Late Tools in Stock

REPUBLIC MACHINERY CO.
134 N. 3rd St., Phila. 6, Pa.
Phone Walnut 2-5513

BUY FROM STOCK
Telephone
BAKER 5887

FALK
MACHINERY COMPANY

10 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented

LATHES

27"x18' MONARCH "N" Geared Head Lathe, 11' centers, Taper Attach., Full Equipment, Late Type. 1942.

24"x12' BOYE & EMMES Timken Bearing, Geared Head, Lathe. Late Type.

27"x16' NILES, BEMENT, & POND Geared Head Lathe, 9' centers, M.D.

24", 36", 42" BULLARD Vertical Turret Lathe, New Era, Turret Head, Side Head, Motor Driven.

No. 601 W.D. OSTER Motor Driven Turret Lathe, 1½" capacity, Late.

1A WARNER & SWASEY Turret Lathe, Heavy Duty, Power Chuck Wrench, Timken Bearing, M.D.

No. 2, No. 3, No. 5, No. 3A WARNER & SWASEY Geared Head Turret Lathes, Bar Feed, Motor Driven.

24"x10' AXELSON Geared Head, Heavy Duty Model "E" 28" Actual Swing, M.D. Taper Attachment. 1942.

No. 7 BARDONS & OLIVER Universal Turret Lathe. 2½" capacity. Preselector Head, Late Type.

12"x18" LIPE-ROLLWAY Semi-Automatic Carbo-Lathe, M.D., 1945.

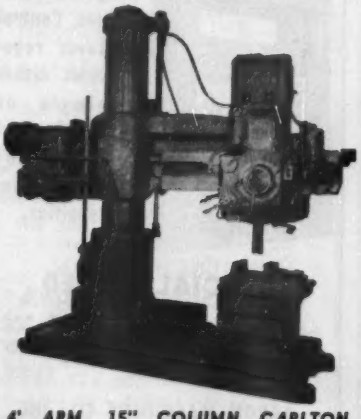
DRILLING MACHINES

4'x15" Column CINCINNATI-BICKFORD "Super-Service" Radial Drill, Motor on arm, Box table.

No. 262 BARNES Motor Driven Sliding Head Drill Press. 2" cap. in steel. 1941.

No. 2 M.T. Six Spindle ALLEN Type KH Drill Press, Individual Motor Drive, Late Type. 1943.

No. M200 DEFIANCE Prod. Drill, 2" cap., ‡5 M.T., 26" swing, 1942.



4' ARM, 15" COLUMN CARLTON RADIAL DRILL. 48 SPINDLE SPEEDS 15-1500 RPM. MOTOR ON ARM. 1943.

MILLING MACHINES

‡2-18 CINCINNATI Plain Auto. Milling Machine, M.D. Late Type.

‡2 KEMPSMITH Horiz. Maxi-Mill, Motor in base, Vert. Head.

‡08 CINCINNATI Vert. Mill, Plain & Rotary Table Type.

‡3B KEARNEY & TRECKER Vertical Milling Machine, Motor in base.

No. 0-8 CINCINNATI Rise & Fall Horiz. Mill, Late Model.

No. 3B KEARNEY & TRECKER Horiz. Mill, Double Overarm, Motor in base.

96" x 86" x 28' NEWTON PLANER TYPE MILLING MACHINE. 2 Heads on Rail; 2 Side Heads; Pendant Control; Late Type.

No. 00G BROWN & SHARPE High Speed Automatic Screw Machine, Motor Driven, Late type.

No. 1 LaPOINTE Motor Driven Horizontal Broach, 5 tons cap., 38" stroke.

50 HP. CHICAGO PNEUMATIC Air Compressor. Type NSB, 253 CFM, Piston Displacement.

10"x10" RACINE ‡30-C Hydraulic Heavy Duty Shear Cut Power Hack Saw, 1946.

10'x10 ga., 10'x¼" WYSONG & MILES Power Squaring Shears, Motor Driven.

‡7A THOMAS open back Inclinable Press 80 Ton cap. Flywheel M. D. 1948.

600 ton NILES-BEMENT-POND Motor Driven Wheel Press, 86" between strain rods, 14' cap., 17" diam. ram.

‡5, ‡7 JOHNSON O.B.I. Presses. 56, 79 tons cap. M.D. Flywheel & Geared Type.

No. 6 FEDERAL O.B.I. Press, 65 tons cap. single geared, 4" stroke, M.D.

½, 1½ BUFFALO FORGE Universal Ironworker, Notcher and Coper, M.D.

T-56 VERSON Power Press Brake, 8' overall, late type. 100 Tons Cap. 1942.

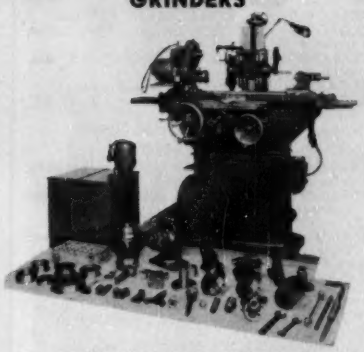
No. 20, WATERBURY FARREL Thread Roller, ⅜" cap., 1944.

No. 8LS FELLOWS M.D. Gear Lapping Machine. With Detachable Head, Universal Work Support.

6"x18" LANDIS Type "C" M.D. Hyd. Cylindrical Grinder, Serial ‡29196.

15' x 10' x 36' BETTS PLANER, DOUBLE HOUSING, BOX TABLE. 2 Swivel Heads on Rail; 2 Swivel Side Heads; Pendant Control Variable Speed Main Drive Motor, 75 HP.

GRINDERS



No. 13 BROWN & SHARPE Universal Tool & Cutter Grinder. Full Equipment. 1943.

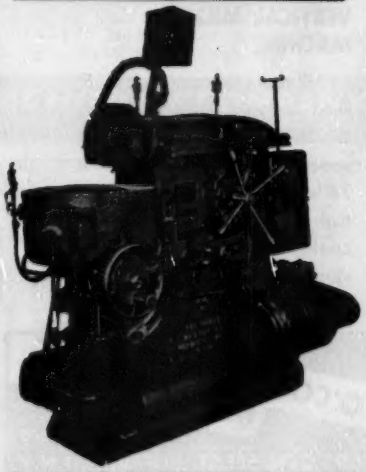
6"x18" NORTON Vertical Hydraulic Surface Grinder, complete with magnetic chucks, coolant systems, Late.

‡TG615 JONES & LAMSON Thread Grinder, Late, M.D. and TG848.

No. 208 BESLEY Motor Driven Disc Grinder, 26" wheels, Late Type.

12" x 24" GALLMEYER & LIVINGSTON Horizontal Hydraulic Surface Grinder, M.D.

12"x36" MATTISON M.D. Hydraulic Surface Grinder, 15 HP Spindle Motor. Coolant System.



No. 22 HEALD MOTOR DRIVEN ROTARY SURFACE GRINDER. 12" Magnetic Chuck. Late Model.

20", 24", 28" GOULD & EBERHARDT V-Ram Shapers, M.D.

No. 194 BARNES Vertical Hone, 4" capacity, 12" stroke, Motor Driven.

OVER 1000 MACHINE TOOLS AVAILABLE IN STOCK • SEND US YOUR INQUIRIES

1941-1954 MACHINE TOOLS

CUTTER & TOOL GRINDERS
FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit

DRILLING MACHINES
ALLEN: No. 2 Drill—6 Spindle, 8" overhang
ALLEN: #2½ High Speed 15" #3 M.T.
BARNES: No. 210, 2-spindle, 21" Swing
PRATT & WHITNEY: ½B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
RADIAL DRILLS: Archdale, 5', 6' & 7', new

GEAR MACHINERY
FELLOWS: 6IA & 64A Shaper, 18" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)
INTERNAL GEAR GRINDER, GG-31

GEAR TESTERS
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 3 Bevel Gear Tester
GLEASON No. 4 and No. 6 Bevel Gear Testers. Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GEAR HOBBERS
CLEVELAND: #130 & 140 Rigidhobbers
REINECKER 60"
BROWN & SHARPE No. 44 20" cap.
LEES BRADNER 49A

GRINDERS—CYLINDRICAL
BROWN & SHARPE: No. 10 cap. 6"x18" plain
CINCINNATI: 6"x18" Hydraulic, Plain
LANDIS: 16"x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
NORTON: 12"x18" Type C, Universal
NORTON: 10"x36", 30 Deg. Angle Wheel
NORTON: 10"x18" 45° angle wheel

GRINDERS—GEAR & SPLINE
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Spines
GLEASON: #17, 23½" P.D.
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
INTERNAL GEAR GRINDER, GG-31

GRINDERS—INTERNAL
BRYANT: No. 5, 5Y, 16-16, 16-CP-16, 16-28, 24-L-36
HEALD: #50 Planetary
HEALD: #72A3 Sizematic
HEALD: #72A3 & #72A5 Extended Bridge

GRINDERS—RADIUS
VAN NORMAN: #78, capacity 7½"
VAN NORMAN: #649-16, cap. 6" to 16" dia.
VAN NORMAN: #3½" Un. Radius

HONING MACHINES
BARNES: Model 172, 2" dia. x 6" stroke
MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2 spindle, ¼" to 1" dia.

LAPPING MACHINES
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical

LATHES—PRODUCTION
BLOUNT: Polishing speed lathe 12" dia. x 48" centers
LODGE & SHIPLEY: #3A Duomatic, 25½" swing x 27" centers
POTTER — JOHNSTON: #4D Auto Turret

LATHES—TURRET
BULLARD: 36" Vertical turret
WARNER & SWASEY: #1A, #2A, #3, #3A, #4, #4A & #5
HERBERT: #0, #2, #4, #7, #8 and #9B/30 Sizes, new

LATHES—TURRET—continued
WEBSTER & BENNETT: Vert. 36" & 48" (New)

MILLING MACHINES
TAYLOR-FENN: M-30 Duplex Spline
RICE-BARTON: 4" Twin Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

SAWS & CUT-OFF MACHINES
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
MARVEL: No. 6A Hacksaw, 6"x6"

THREAD MILLERS & TAPPERS
HALL PLANETARY: Mod "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: #40A Thread Miller
LEES-BRADNER: GT-36 Thread Miller chucking type, 13¾" hole
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. capacity.
NATCO: 16 spindle Tapper ⅝" cap.

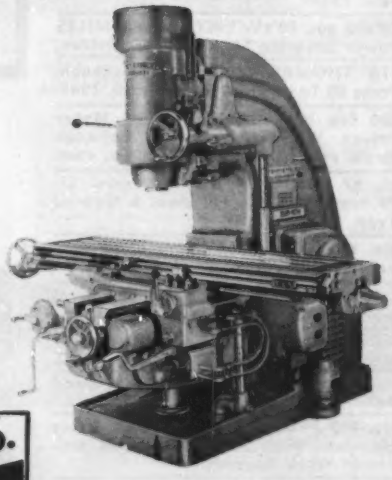
MISCELLANEOUS
GARDNER: Model 84A Double Disc Grinder, 23" Wheel
MOLDING MACHINES, ROLLER JOLT: Osborne Model 2047-3
AUTOMATIC SCREW MACHINE, Wickman Single Spindle, 7/16" New
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½" & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
HARDNESS TESTER: Grogan Brinell, 16-8
SHEFFIELD: Precisionaire Gauge
SUNDSTRAND: Double-End, #53, 42" & 60" Centering Mach.
WIRE FORMING MACHINES: 4-slides (new)

TRIPLEX MACHINE TOOL CORP. ESTABLISHED 1919
75A West Street, New York 6, New York
Cable Address TRIMACTOOL

Practically NEW!

No. 4CH
KEARNEY & TRECKER
VERTICAL MILLING
MACHINE

15 HP main drive motor, 3 HP feed & rapid traverse motor, ¼ HP coolant motor; 24 speeds 15 to 1500; table 74"x15½"; monolever control; back lash eliminator, coolant system; micrometer stop & dial indicator.



O'CONNELL MACHINERY CO.
Tel. BAiley 5800
1695 GENESEE ST. BUFFALO 11, N.Y.

CHAMBERSBURG
CECOSTAMPS

NEW
1945

Air operated Impact Machines, Control Lever regulates either single or series of blows of various intensities.

SPECIAL PRICED

MAX. DIE AREA	STROKE INCHES	DIE, MAX. WEIGHT
96" x 60"	23	21,100
120" x 96"	34	42,300

AARON MACHINERY CO., INC.
45 CROSBY ST., N. Y. 12, N. Y.
WO-4-8233 Cable: AARMACH, N.Y.
RENTAL & TIME PAYMENTS

WORLD'S LARGEST STOCK
PRESSES
JOSEPH HYMAN & SONS
TIOGA, LIVINGSTON & ALMOND STS.
PHILADELPHIA 34, PA. • REGENT 9-7727

HILL-CLARKE MACHINERY COMPANY

ESTABLISHED 1867 · W. L. DITFURTH, President · T. H. PRICE, Vice President · E. R. MONS, Secretary

Partial List

Boring Machines
100" Niles-B-Pond Vert. Bor. Mill

Broaching Machine
No. 3L La Pointe Horiz. Hyd. Broach

Drills
4'11" American Hole Wizard Radial Drill
No. 2 Avey Cam Fd. Drill. 14" Swing
No. 2MA-6 Avey 24"—1 Spdl. Drill.
2 Spdl.—24" S.W.—No. 3 Avey
No. K60H Fox 16 Spdl. Multi Drill
No. 2-20" 2 Spdl. Leland-Gifford LMS Drill
No. LBM-20" 3 Spdl. Leland-Gifford Drill
No. 2MS Allen 3 Spdl. Drill, 24" swing

Gear Machines
11" Gleason Gear Generator
No. 12HS Gould & Eberhardt
No. 36-BM G. & E.—3 spdl. Rougher
615-A Fellows Gear Shaper
612-A Fellows Gear Shaper

Grinders
6"x18" Norton Type C Plain (1943)
10"x18" Norton Type C Plain Hyd. Cam Gdr.
10"x36" Norton Type C Grinder
10"x36" Norton Type C Cam Grinder
14"x48" Landis Type C Pl. Gdr.
16"-40" Gap x 120" Norton Pl.
18"120" Norton Type C Pl.
20"x192" Norton Type A Pl.
B-24—25" Chuck Arter Surf. Gdr.
No. 16-30" Blanchard Rotary Surface Gdr.
TG615 J & L Thread Gdr.
No. 214 Besly Double End Disc Gdr.
No. 2 Cinn. Centerless Grinder

Internal Grinders
No. 5 Bryant Internal Grinder
No. 5B Bryant Internal Grinder
No. 16-16 Bryant Int. Grinder
No. 16-28 Bryant Int. Grinder
No. 16-38 Bryant Int. Grinder
No. 24 L-36 Bryant Hyd. Int. Grinder
No. 16 A-28 Bryant Internal Grinder
No. 24-26 Bryant Int. Grinder
No. 24-36 Bryant Internal Grinder
No. 81 Heald Internal Centerless
72-A5 Heald Int. Gdr. (1942)

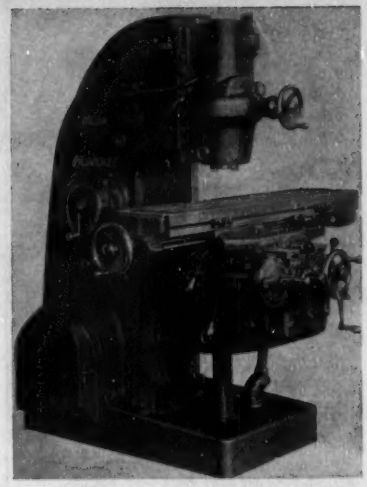
Hill-Clarke Norton Type Motor Driven Grinders
10"x36" Centers. 14"x36" Centers
10"x72" Centers. 14"x50" Centers
10"x96" Centers. 14"x72" Centers
18"x96" Centers. 14"x96" Centers
18"-30" gap x 96" Centers

Hones
Model H-2 Micromatic Horiz. Hone
Model 200-H5-Dbl. End. Micro. Horiz.
Model H-7 Micromatic Vert. Hone, etc.
No. 224 Barnes Vert. Hone
No. 306-H Barnes Vertical Hone

Lathes
No. 4D Potter & Johnston Auto Lathe
R-14 Lo-Swing Automatic Lathe
12"x21" Fay Automatic Lathe
12"x63" Fay Automatic
18"x6' Am. Geared Head Lathe
27"x12' American Geared Hd. Lathe
36"x18' Putnam Grd. Hd. M.D.

Turret Lathes
No. 1A Warner & Swasey Turret
No. 5W Acme Tur. Lathe (Late)
No. 2 Warner & Swasey Electric Head Turret
No. 2 Warner & Swasey Geared Head
No. 2 Warner & Swasey Turret
No. 3AL Gisholt, Cross-Slide Turret
No. 3 Warner & Swasey Turret Bar Feed
No. 4A Warner & Swasey Turret
No. 6 Warner & Swasey, cone head
No. 7A Jones & Lamson Turret
2¼"x24" Jones & Lamson
18" Libby, M.D.
No. 3H-10 Libby International, 29" SW
No. 4A Warner & Swasey (1944)

Planers
48"x36"x14' Gray, 2 Heads



No. 3K Milwaukee Vertical Miller, 10 H.P. A.C. Motor-in-Base, 4 position stop & dial indicator, power feeds & rapid traverse. 24 speeds, 15-1500 R.P.M. Table 64"x14". Sq. wt. 9200 lbs. Serial 15-31-47

48"x48"x12' Cincinnati, 2 Heads
60"x48"x27' American, 4 Heads

Milling Machines
No. 4 Cinn. Pl. Hi-Speed Dial Type (1944)
No. 2-HL Kearney & Trecker Pl. Mill
No. 3K Kearney & Trecker Vert.
No. 4H Kearney & Trecker Vert. Mill
No. 08 Cincinnati Vert. (1942)
10"x48" Hanson-Whitney Thrd. Mill
10"x60" Pratt & Whitney Thrd. Mill
12"x102" Mod. HT Lees Bradner Thrd. Mill
54"x30"x16' Ingersoll Slab Mill

Write, Wire or Phone **HILL-CLARKE MACHINERY COMPANY**
651 WASHINGTON BOULEVARD, CHICAGO 6, ILL. PHONE CEntral 6-0500

IF THERE IS
Anything you want
that other readers of this publication can supply
OR—
Something you don't want
that other readers can use advertise it in the
SEARCHLIGHT SECTION
American Machinist

B & S No. 2 High Speed Automatics, M.D.
Natco Nos. G5 & 12C Drills, M.D.
Fellows Nos. 8M & 3M Red Liners
Hardinge H.C.T. Sec. Oper. Lathe
D. E. DONY MACHINERY CO.
4357 St. Paul Blvd., Rochester 17, N. Y.

SPECIAL!!
New Yale & Towne 2 Ton Spur Geared
CHAIN HOISTS
Gov't Surplus—Original Boxes
List Price $235.00
WHILE SUPPLY LASTS **$124.50** fob. K.C.
Also 6" H.D. Swivel Rock Island VISE list $104.00 **$69.50**
Rated Firms 30 days or send 25% Dep. with order bal. COD —Write for complete Surplus list—
ATLAS EQUIPMENT CO.
229 S W BLVD. KANSAS CITY, MO.

CHOICE MACHINE TOOLS
100" Betts V.B.M. 2 Swivel Heads
8-Sp 16" Type D Bullard Multaumatic
6" Niles, Floor Type 14x14' Plate
68"x21' C C Bridgeford Geared Head
#11 Blanchard, 16" Chuck 1942
#18 Blanchard, 36" Chuck 1942
16"x72" Cincinnati Cylindrical 1942
20 MB Smalley-General Thread Mill '42
Tangent Bender Single Wing Struthers-Wells 1947
36"x8' Betts Geared Head 1942
2½" A Cleveland SS 1945
0-8 Cincinnati R&F Prod. Mill 1942
2-18 Cincinnati R&F Prod. Mill 1942
NOLL EQUIPMENT CO.
4535 St. Clair Ave., Cleveland 3, O.
EXpress 1-0700

LATE MODEL GUARANTEED MACHINE TOOLS

BORING MACHINERY

Model 61 Exacto 6-spindle cyl. borer, 1948
42" Bullard New Era vertical T/L
3½" Bar No. 52 Lucas, horizontal, table type
36" Rogers vert. T/L side head, new 1942
36" Bullard vert. T/L, side head, #11325
72" Niles Bement Pond 2 heads, PRT, #17623

DRILLS, RADIAL

3½ ft. arm 8" column American sensitive
4' arm 13" col. Carlton M.O.B.
9 ft. arm 16" column American, late type.

GEAR HOBBERS

Type A Barber Coleman universal
No. 3 Barber Coleman std (3)
No. 12 Barber Coleman (3)
No. 12H Gould & Eberhardt universal
No. 36H Gould & Eberhardt universal
72" Schuchardt & Schutte universal

GRINDERS, CYLINDRICAL

4"x18" Cincinnati pl. hyd., plunge cut, 1948
6"x30" Norton "G" hyd., 1942
10"x18" Norton types BA, A G, late models
10"x18" Cincinnati Simatic, type ER (2), 1941-1946
16"x36" Norton type C hydraulic (2), 1943
14"x36" Landis type C, hydraulic (2), 1946
16"x36" Norton type C, hydraulic (2), 1943
16"/26"x72" Norton type C, hydraulic, 1945
18"/48"x120" Landis gap type, hydraulic, serial 18195
18"/48"x96" Landis gap type hydraulic, new 1941
No. 13 Brown & Sharpe universal tool, new 1942

GRINDERS, SURFACE

16A2 Blanchard rotary surface, serial 6848, 1946
6"x18" Norton vert. spdl. hydraulic, 1942
8"x22" No. 3 Abrasive, motor in base
12"x48" Model 300 Hanchett vert. spdl. 1948
14"x28" Pratt & Whitney vertical surface grinder, 1943.
72" No. 72 Hanchett rotary surface, 1946

INTERNAL GRINDERS

Nos. 72, 72A3 and 72A5 Heald
No. 5 Bryant semi-automatic chucking
No. 2 Cincinnati centerless (3), 1942-1943
No. 40 Van Norman radius, 1945

LATHES, ENGINE

14"/28"x36" centers Smith-Drum, esp. 1945.
14"x42" Hendey G.H., M.I.B., 1940
24"x14 ft. bed American G.H., Q.C.G., serial 44878
52"x30 ft. bed Niles Bement Pond G.H., like new

LATHES, MFG. & MISC. & TURRET

17"x72" LeBlond Rapid production (3), 1946-1947
No. H5 Libby international saddle type universal turret lathe, 1940
No. 5 Jones & Lamson Universal ram type turret lathes, (2) late models

MILLING MACHINES

No. 2 Brown & Sharpe vertical
No. 2 Cincinnati Hi-Power plain horizontal
No. 4 Cincinnati Hi-power plain horizontal
No. 5 Cincinnati Hi-power plain horiz., vert. attach.
No. 2-18 Cincinnati production mill, late
1-12 Cincinnati production miller
No. 4-30 and 4-48 Cincinnati Hydromatic production
No. 2B and 3K Milwaukee universal
No. 3B and 4K Kearney & Trecker plain, late type
No. 22L Van Norman pl. horiz., 1942.
54" Ingersoll 3 spdl rotary, 1940.
24"x24"x12 ft. Ingersoll adj. rail planer type mill, tracer controlled, 1945
30"x21"x12 ft. Ingersoll fixed rail planer type mill
42"x42"x18 ft. Ingersoll adj. rail double housing mill, 2 S.H. and 1 R.H. power on rail and head
42" Ingersoll 8 spindle rotary continuous mill
42" Ingersoll 2 spindle rotary continuous mill
48"x20"x20 ft. Ingersoll fixed rail double faced planer type mill
60"x48"x16 ft. Ingersoll adj. rail double housing planer type mill, 2 S.H. and 2 R.H.
72" swing 64" table Ingersoll 2 spindle rotary continuous mill, timken bearings.

PRESSES

500 Ton Baldwin Southwark Hyspeed Hydraulic (2) 1939
600 Ton No. 2316½ Hamilton Forging
750 Ton No. 3 National Maxi-Press
1000 Ton No. 606 Toledo Forging
105 Ton No. 7½ Verson O.B.I. (2)
200 Ton No. 23 Bliss embossing
300 ton No. 1035 Hamilton S.A., D.C.
400 ton No. 606 Toledo knuckle joint
108 Ton No. 93C Toledo SS, DC, air cushion
2 to 70 ton Ferracute punching (several)
3 to 60 ton O.B.I., most every make

SHAPERS & SLOTTERS

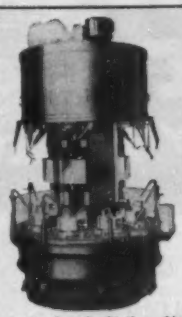
24" Gould & Eberhardt ind. universal shaper
32" Gould & Eberhardt invincible, P.M.D.
36" Rockford vert. hyd. slotter, 1942

Write For Our Illustrated Catalogue of Over 1000 Machine Tools

MILES MACHINERY CO.

2039 East Genesee Ave.

Saginaw, Michigan Phone 2-3105



EXCELLENT PRODUCTION MACHINERY TO FILL THE GAP IN YOUR PLANT
BULLARD MULT-AU-MATICS

Slides Equipped with Std. Universal, Cross Compound Heads and Plain Vertical Heads

2—Type D 12" 8-spindle S/N 22157 & S/N 16878 with Standard chucks—30 HP motors
1—Type D 8" 8-spindle S/N 15010 with Std. Chucks
1—Type D 8" 8-spindle S/N 15170 with chucks 25 HP motors

ALSO AVAILABLE FROM STOCK

V-8 CRANKSHAFT MACHINERY

2—Wickes Model MF-4 Heavy Duty Automatic Single Spindle Multiple Crankpin Turning Lathe S/N 7100-1-2. 19.7 Machines complete with Motors and Controls.
3—C.F.B.-4-F Milling Pin Bearing Lathes S/N 346, 347 and 380. 1944 Machines Complete With Motors and Controls.
2—Snyder 6 Station Single End Hydraulic Re-centering Machine S/N 19347. 1946 Machines complete with Motors and Controls.
2—22L.B LeBlond Double Center-Drive Automatic Crankshaft Lathes S/N 2 L.B-30-34. 1947 Machines Complete with Motors and Controls.
1—V-8 Landis Crankshaft Pin Grinder 16x32", single wheel, S/N 16411; 3 motors & controls.

GEAR EQUIPMENT

7—Fellows Model 27 High-Speed Gear Shapers S/N FS162, FS186, FS234, FS249, FS262, FS263, 13237.
1—Cleveland Model 220—8 spdl. Hobber S/N 86-662.
1—Fellows Model 75 High Speed Gear Shaper S/N 15418.
2—Fellows Model 725A High Speed Gear Shapers S/N 18714-19291.
3—National Red Ring GCC 8" & 12" Gear Shavers S/N 170, 334, 100.
1—Cross 241 Duplex Chamfering Machine S/N 578
1—4T Fellows Thread Generator S/N 11012.

NUT TAPPERS

4—⅜" National Bent Shank Nut Tappers
2—⅞" National Bent Shank Nut Tappers

GRINDERS

No. 2 Oliver Arc Face Grinder, cap. 6" to 26", S/N 2C-507 (1948) Machine equal to new.
1—2-spindle Besley Vertical 36" grinder S/N 282B automatic sizing, Hydraulic Index Table
No. 2 Cinn. Tool & Cutter Grinder S/N ID2TIP-43 (1946) Machine equal to new. Has complete tooling.
Do-All Surface Grinder, Model G-10 S/N 43510 with 8x24" Perm. Mag. chuck. Completely rebuilt.

CHUCKERS

2—Baird Mod. B Chuckers, 6 spdl. 7" cap. rear slide

DRILLS

2—HO Baker Drills #4 MT—S/N 11601, 11603
1—36 HO Baker Drill, 15 HP Motor.
1—Hammond Opposed Head Drilling and Reaming Machine. 10 Station Index S/N 67.

ED SMITH MACHINERY SALES

1527 Lillibridge Ave. Valley 2-4830 Detroit 14, Mich.

MDNA MEMBER

MOST DIVERSIFIED STOCK IN THE U. S.

POWER PRESSES all types, 1-1000 ton
POWER PRESS BRAKES & POWER SHEARS
WIRE WORKING MACHINERY, Wire Drawing, Straightening and Cutting 4-Slide Wire Forming Machines
ROLLING MILLS, SLITTING MACHINES
BOLT & NUT MACHINERY
ROLL FORMING MACHINES
MACHINE TOOLS

"If it's machinery; we have it."

NATIONAL MACHINERY EXCHANGE

138 Mott St., N. Y. CAnal 6-2470

BENNETT MACHINERY CO.

GUARANTEED MACHINE TOOLS

AUTOMATICS, 1¾" 8 Spin. Conomatic
BORING MILLS, 42" Bullard, Spiral Drive
54" Bullard, New Era, Excellent
72" Cinci., 2 Hds., P.R.T.
100" & 72" N.B.P., 2 hds., M.D.
3½" bar Defiance, Table (2)
4½" bar Sellers Floor Type
8" Bar Niles, Floor type
RADIAL DRILLS, 5'/15" col. Amer., Moter-on-Arm
GRINDER, 16"x96" Landis Hyd., Late
GEAR SHAPERS, Nos. 645A3, 61A & 61 Fellows
LATHES, 50"x30" Bed Niles, Late, Wet Hd.
16"x154" Cen. Hendey, T.A., Tim.
14"x60" cen. Amer. T.A.
SLOTTERS, 20"x24" & 12" Drill-Lobdells
36" Rockford Hyd. 1942

375 Allwood Rd., Clifton, New Jersey
Phone PRescott 9-8996 N. Y. Phone LOngacre 3-1227

HOBBING PRESSES
REASONABLY PRICED

Capacity 3000 Tons—Platen Area 40"—Movable Top Head, Adjustable from 24" min. to 48" max.—Approx $5000 worth of Tooling.

• • •

Capacity 1000 Tons—Self Contained—Complete with Safety Guard and maximum Pressure Regulator.

M & N HYDRAULIC PRESS CO.

780 ROUTE 3, CLIFTON, N. J.

ELECTRIC FURNACE TO 1850°

with Auto Temperature Control. Sliding door. Cheap to operate. Substantial Dependable for Machine Shop Tool Room.

8" x 12" x 15" Inside 4.5 K.W. $250.00
12" x 16" x 20" inside 9.0 K.W. $500.00

E. H. WILLIAMS

BOX 9042A, HUNTINGTON, W. VA.

FOR SALE

WARNER & SWASEY 5-spindle AUTOMATIC CHUCKER

6" capacity Serial 1304871 Extra Tooling. Used 9 months. Under power.

RADAX MANFG. CO. INC.

124 Market Street, Rochelle Park, N. J.

Indianapolis MACHINERY & SUPPLY CO.

1961 South Meridian Street
Indianapolis 6, Indiana

- TG636 Jones & Lamson Precision Thread Grinder, 1942
- HP-100 La Pointe 50 Ton Broach, 1945

Write for Complete Stock List

LATE TYPE MACHINE TOOLS

MACHINERY FOR SALE
ATTENTION EXPORTERS

Unusual opportunity to procure modern Fellows Gear Shapers 615A and 645 as well as 12" Gleason Generators, 36 BM Gould & Eberhardt Rougher, #7 Fellows Gear Shaper, #1d D. E. Whiton Machine. Write for full information.

FB-1633, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

24"x144" BOYE & EMMES Geared Head Engine Lathe.

22"x336" Centers MONARCH Model M 16-Speed Helical Geared Head Lathe, Two carriages, actual swing 27½".

24"x276" LANDIS Plain Cylindrical Grinder

WIGGLESWORTH INDUSTRIAL CORP.
68 Border Street—East Boston 28, Mass.

Index of PRODUCTS ADVERTISED in This Issue

Abrasives, Coated.....18-19, 29, 207, 237

Accessories & Attachments (Machine Tool) 206, 246, 250

Bearings .....4th Cover, 48

Blast Cleaning Equipment & Supplies 252

Books, Technical 254

Boring, Drilling & Milling Machines (Horizontal) .....3rd Cover, 14-15, 16-17, 255, 267

Boring Machines Internal .....2nd Cover

Boring & Turning Machines (Vertical) .....Insert Bet. 32A-32D, 67

Broaching Machines 74, 81, 153, 154

Brushes 208B

Castings 87, 198

Chucks 225, 256

Cleaning & Drying Machines & Supplies 85

Collets 206, 252

Controls Electrical 52-53, 88-89, 213, 233

Cut-Off Machines 46, 209

Cutters, Abrasive 187

Diamond Wheels 210

Drafting Room Equipment & Supplies 252

Dressers 238

Drilling Machines 30-31, 35, 65, 75, 106, 181, 232, 250

Drill Jig Bushings 98

Duplicators & Pantographs.....16-17, Insert Bet. 64-65, 183

Fabricating Methods & Services 238

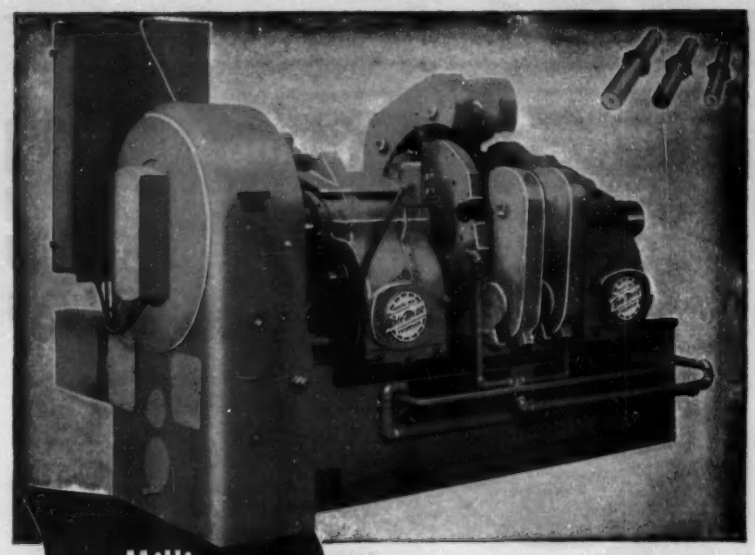
Fasteners 156, 179, 193, 246, 250

Forgings 223

Gages & Instruments.....28, 34, 50, 72-73, 177, 220-221, 238, 246, 248, 250, 258

Gear Cutting Machines.....3, 6-7, 236, Insert Bet 240-241

(*Continued on page* 268)



Milling and Centering Simultaneously and in Continuous Production

Here's an excellent example of how two entirely different operations can be combined on one machine. This Davis and Thompson continuous type Roto-Matic both mills and centers on both ends in one operation. Rough and finish milling cuts on the ends of the shaft and centering of both ends is completed with only one rotation of the fixture drum. The centering heads travel with the work station until centering operation is complete then drop back to next work station and repeat. Automatic equalizing clamping is provided to the fixture. Spindles have micrometric adjustment and spindle carriers are adjustable on the ways to accommodate shafts of various lengths.

FREE DATA on this and other Davis and Thompson machines is available in our bulletin No. 1000.

Roto-Matic

Davis and Thompson Co.

4460 N. 124th ST. MILWAUKEE 18, WISCONSIN

Take the GLARE out of Micrometer Reading with the "Lustro-Chrome" MICROMETER

MEASURE TO 1/10,000th

All graduations are well-defined black lines on dull chrome surface for easier and surer reading, even in poor light. Guaranteed accurate within one half of a ten thousandth of an inch.

Drop-forged model with chrome finished micrometer head, from $8.25 up. Ask for Micrometer Catalog

No. 901C 0-1" Size with LOCK NUT and RATCHET and 10th vernier as shown $13.25

This tool with TUNGSTEN CARBIDE tipped anvils $15.75

GEO. SCHERR CO., INC. 200 AM LAFAYETTE STREET • NEW YORK 12, N. Y.

"Switching to NILSON 4 SLIDES Saved us $17,656 on metal alone"
Yes, simply by changing stamping methods, this NILSON Customer profited 4 ways:
1. Production increased 80%.
2. 72% less metal used (per 4 million pieces).
3. Greatly improved quality with minimum of rejects.
4. Strengthened competitive position with greater profit margin.
You, too, can enjoy these advantages in producing your own wire forms and small metal stampings. Parts such as illustrated in the margin were straightened, fed, pierced, blanked, swaged, stamped or coined, cut-off and formed AUTOMATICALLY in NILSON 4 SLIDES in one quick precise operation. ONE Machine. ONE Operator.
NILSON 4 SLIDES available in wide range of sizes: forming Wire up to ½" diam. in feeds to 32" max. and Metal Ribbon stock up to 3½" wide. Press sections 5 to 30 ton capacity. Heavy Duty Types in 50 and 75 ton models.
MODEL S-3-F Nilson 4 Slide with No. 51B Nilson Tilting Stock Reel.
THERE'S NOTHING LIKE A NILSON
Write, Wire, Phone for full particulars.
THE A. H. NILSON MACHINE COMPANY
1819 Railroad Avenue • Bridgeport 5, Connecticut

From the *American Machinist* Library of *Tips for Top Shop Men*

THE common belief that "perishable tools" are written off when they go out to the machine is one of today's most expensive notions. Unless control is exercised *in use* as well as in stocking, the machine, method or man that breaks or ruins an excessive number of tools is never spotted. In one test, ratio of tool use on two machines of the same type on the same job was 1 to 7.

Index of PRODUCTS ADVERTISED In This Issue

(*Continued from page* 267)

Gears, Speed Reducer, Motor Reducers ..... 52-53, 88-89, 191, 196, 201, 236, Insert Bet. 240-241 269

Gear Testers 3, 6-7

Grinders—Cutter & Tool 90, 272

Grinding Machines—Production 4-5, 8-9, 12-13, 26-27, 32, 84, 92, 110, 229, 241, 244, 272

Grinding Wheels 33

Heads: Drilling, Grinding & Tapping 238, 267

Heat Treating Equipment & Supplies 254

Honing Machines 100

Hydraulic & Pneumatic Parts & Equipment 199, 235, 252

Jig Borers 30-31, 269

Lathes, Automatic 43, 82

Lathes, Engine ..... 44-45, Insert Bet. 64-65, 70, 86, 197, 204-205, 219, 222

Lathes, Turret 22-23, 60-61, 197

Lubricants, Cutting Fluids, Quenching Oils & Solvents ..... 158, 202, 216-217, Insert Bet. 224-225

Marking Machines, Tools, & Supplies 246

Materials, Cutting & Forming 54, 58-59, 68-69, 77, 78-79, 80, 91, 160, 185, 195, 214, 222, 239, 243, 251

Materials of Manufacture ..... 56-57, 58-59, 68-69, 104-105, 109, Insert Bet. 176-176C, 185, Insert Bet. 224-225, 231, 245, 253

Materials Handling Equipment 246

Millers, Die Sinkers, Profilers 20-21, 102, 252

Motors, Electrical ..... 38, 52-53, 88-89, 208, Insert Facing 208

Index of PRODUCTS ADVERTISED In This Issue

Nibbling Machines 187

Power Transmission 234

Presses, Forging & Forming Equipment & Supplies ... 32A, 46, 62, 64, 71, 76, 96, 112, 223, 230, 238, 240, 245, 246, 247, 250, 268

Production, Inventory & Tool Control 200

Pumps, Circulating 228

Riveting Machines 238

Rust Preventives 269

Safety & Welfare Equipment 42

Saw Blades 66, 203, 250

Sawing Machines 66, 215

Screw Machines; Chucking Machines 39, 51, 55, 211, 212, 249

Shapers, Slotters, Keyseaters 40-41, 112, 228, 238

Special Machine Tools 240, 242

Stampings 206, 246

Tapping Machines 75

Thread Cutting Machines 248

Thread Rolling Machines & Tools 10-11, 110

Tooling Set-up Equipment ... 106, 206, 258

Tools, Cutting 24-25, 36-37, 47, 63, 74, 81, 83, 93, 154, 189, 210, 218, 224, 240, 243, 248, 251, 258, 267

Tools, Hand 32D

Tools, Measuring 256

Tools, Portable 226-227, 232

Universal Joints 218

Used & Surplus Equipment 261-266

Vises 254

Welding & Cutting, Brazing & Soldering Equipment & Supplies Insert Bet. 48-49, 240

Everyone recognizes this as a sign of Thanksgiving . . .

And smart gear users know this CINTI is the sign of the best in custom made gears.

May We Send You Our Brochure?

CINTI "Gears . . . Good Gears Only"

THE CINCINNATI GEAR CO. • CINCINNATI 27, OHIO

RUST-LICK

WATER SOLUBLE - NON-FLAMMABLE - RUST PREVENTIVE

RUST-LICK "C-W-25" provides the latest development for a Non-flammable, Cold Dipping or Spraying solution for the protection of finished ferrous parts, assemblies, raw stock and between operations. Mixes readily with cold water and upon drying a thin oily film plates-out and protects surfaces from corrosion during indoor storage.

Write, phone or wire for sample and literature.

PRODUCTION SPECIALTIES, INC.
755 BOYLSTON ST., BOSTON 16, MASS.

Save your large JIG BORERS for large jobs . . . put small precision work on the LINLEY . . .

The Linley Jig Borer provides the means . . . at very low cost . . . of handling your most exacting requirements in precision. With it you can cut costs through having a tool exactly fitted to your small work . . . save your larger machines for larger work.

Specifications

Table Movement: 6" x 10" Table Size: 7" x 17½"

Send for complete information TODAY!

LINLEY BROTHERS CO.
664 STATE ST. EXT., BRIDGEPORT 1, CONN.

ADVERTISERS INDEX

This index is published as a convenience to the readers. Every care is taken to make it accurate, but AMERICAN MACHINIST assumes no responsibility for errors or omissions.

	Page
Abrasive Machine Tool Company	241
Abrasive Products Inc.	207
Acromark Company	246
Adamas Carbide Corp.	214
Advance Products	258
Allen Mfg. Co.	193
Allis-Chalmers Manufacturing Co.	38
Amarillo Gear Works	236
American Brass Company	Insert Between 176 & 176C
American Broach & Machine Co.	74
American Chain & Cable Co., Inc.	187, 248
American Gear & Mfg. Co.	196
American Machinist	94-95
American Optical Co.	42
American Steel Foundries, Elmes Engineering Div.	96
American Steel Foundries King Machine Tool Division	67
American Steel & Wire Division	104-105
American Tool Works	35
Armco Steel Corp.	109
Armstrong-Blum Mfg. Co.	66
Armstrong Bros. Tool Co.	32D
Arrow-Hart & Hegeman Electric Company	213
Austin Industrial Corp.	252
Avey Drilling Machine Co.	106
Axelson Mfg. Div. Pressed Steel Car Co. Inc.	219
Baird Machine Company	211
Bardons & Oliver Inc.	60-61
Bay State Tap & Die Co.	224
Behr-Manning Corp.	18-19
Bellows Co.	235
Bethlehem Steel Company	195
Bilgram Gear & Machine Company	236
Blanchard Machine Co.	84
Bristol Brass Corp.	231
Bryant Chucking Grinder Company	55
Buckeye Tools Corp.	232
Bullard Co.	Insert Between 32A & 32D
Butterfield Div. of Union Twist Drill Co.	47
Campbell Div., Andrew C., American Chain & Cable Co., Inc.	187
Carboloy Dept. of General Electric Co.	77, 78-79, 80
Carroll & Jamieson Machine Tool Co.	222
Chambersburg Engineering Co.	223
Cincinnati-Bickford Tool Co.	65
Cincinnati Gear Co.	269
Cincinnati Grinders Incorporated	4-5, 26-27
Cincinnati Milling Machine Co.	4-5, 26-27
Cincinnati Milling Machine Co. Hydroform Division	71
Cincinnati Shaper Company	40-41, 112
Clark Co., Robert H.	240
Cleveland Crane & Engineering Co.	46
Colonial Broach Company	81
Columbia-Geneva Steel Div.	58-59, 104-105
Columbia Tool Steel Company	222
Columbus Die-Tool & Machine Co.	238
Cone Automatic Machine Co.	51
Cosa Corporation	249
Cro-Plate Co.	252
Crucible Steel Co. of America	54
Curtis Universal Joint Co.	218
Davis & Thompson Co.	267
Davis Keyseater Company	238
Dayton Rogers Mfg. Co.	252
Do All Company	244
Dow Corning Corp.	Insert Between pp 224 & 225
Eastern Machine Screw Corporation	238
Eastman Kodak Co. Industrial X-Ray	177
Economy Engineering Co.	240
Elastic-Stop Nut Corp.	179
Electro-Lift Inc.	246
Elmes Engineering Div. American Steel Foundries	96
Ex-Cell-O Corporation	98
Federal Machine & Welder Company	230
Federal Products Corp.	72-73
Fellows Gear Shaper Company	6-7
Foote Gear Works, Brad	196
Foote-Burt Company	153
Fosdick Machine Tool Company	30-31
Gallmeyer & Livingston Co.	272
Gardner Machine Co.	29
Gates Rubber Company	234
General Electric Apparatus Dept.	52-53, 88-89, 208, Insert facing p. 208
Giddings & Lewis Machine Tool Company	14-15
Gisholt Machine Company	82
Gleason Works	3
Gorham Tool Co.	93
Goss & DeLeeuw Machine Company	212
Grant Gear Works Inc.	236
Grant Mfg. & Machine Company	238
Gulf Oil Corporation	216-217
Hanchett Magna Lock Corp.	225
Hardinge Brothers, Inc.	70
Heald Machine Company	2nd Cover
Henry & Wright Div. Emhart Mfg. Co.	32A, 246
High Duty Alloys Ltd.	253
Hones, Inc., Charles A.	254
Illinois Gear & Machine Company	191
Jones & Lamson Machine Co.	32
Jones & Laughlin Steel Corp.	91
Kaiser Aluminum & Chemical Sales Inc.	56-57
Kalamazoo Tank & Silo Co.	215
Kearney & Trecker Corp.	20-21
Kennametal Inc.	251
King, Andrew	250
King Machine Tool Div. American Steel Foundries	67
Landis Machine Company	10-11
Landis Tool Company	12-13
LeBlond Machine Tool Co., R. K.	44-45
Leland-Gifford Company	181
Link-Belt Co.	48
Linley Brothers Co.	269
Lobdell United Company	209
Lodge & Shipley Company	86
Lucas Machine Division The New Britain Machine Co.	3rd Cover
Luers, J. Milton	250

ADVERTISERS INDEX

	Page
M.B.I. Export & Import Ltd.	254
McCaskey Register Div. Victor Adding Machine Company	200
McGraw-Hill Book Co., Inc.	254
Mechanite Metal Corp.	87
Metal Carbides Corp.	243
Michigan Tool Company Insert Between	240-241
Micromatic Hone Corp.	100
Micro Switch Div. Minneapolis-Honeywell Regulator Co.	233
Minnesota Mining & Mfg. Co.	237
Minster Machine Company	76
Monarch Machine Tool Company Insert Between pp.	64 & 65
Morse Twist Drill & Machine Co.	24-25
Motch & Merryweather Machinery Co.	102
National Acme Company	39
National Automatic Tool Co.	75
National Broach & Machine Co.	154
National Machine Tool Company	228
National Machinery Co.	247
National Malleable & Steel Castings Company	198
National Tool Company	63
National Twist Drill & Tool Co.	37
New Britain Machine Company, The	3rd Cover
Nilson Machine Co., A. H.	268
Norton Company	33
Oakite Products Inc.	85
Oliver Instrument Company	90
Osborn Mfg. Co.	208B
Ottemiller Co., Wm. H.	246
Perkin Elmer Corp.	258
Philadelphia Gear Works	201
Pittsburgh Gear Company	196
Potter & Johnston Co. Sub. Pratt & Whitney Div. Niles-Bement-Pond Co.	43
Powell Pressed Steel Company	206
Pratt & Whitney Div. Niles-Bement-Pond Company	16-17, 220-221
Production Specialties Inc.	269
R. B. Tool Company, Inc.	248
Reid Brothers Co., Inc.	92
Revere Copper & Brass Inc.	185
Rivett Lathe & Grinder Inc.	49
Ruthman Machinery Company	228
Ryerson & Sons, Inc., Joseph T.	160
Sales Service Machine Tool Co.	250
Scharmann & Co., GMBH	255
Scherr Co., Inc., George	238, 256, 267
Seneca Falls Machine Company	204-205
Sheffield Corp.	110
Sidney Machine Tool Company	183
Sigourney Tool Company	250
Simmons Machine Tool Corp.	257
Simonds Saw & Steel Company	68-69
Skil Corp.	226-227
Smit & Sons Inc., J. K.	210
Smith Corp., A. O. Insert Between	48 & 49
Smith Welding Equipment Corp.	240
South Bend Lathe Works	197
Stahl Gear & Machine Company	236
Standard Tool Co.	83
Staples Tool Company	258
Steelweld Machinery Division Cleveland Crane & Engineering Company	46
Strong Carlisle & Hammond Co.	250
Sun Oil Company	158
Taft-Peirce Mfg. Company	34, 50
Tennessee Coal & Iron Div.	58-59, 104-105
Thompson Grinder Company	229
Thompson & Son Co., Henry G.	203
Timken Roller Bearing Co.	4th Cover
Union Drawn Steel Div. Republic Steel Corp.	239
United States Steel Co.	58-59
United States Steel Corporation	58-59, 104-105
United States Steel Export Co.	58-59, 104-105
United States Steel Supply Division-United States Steel Corp.	58-59, 104-105
U. S. Tool Co., Inc.	62
V & O Press Co. Div. Emhart Mfg Co.	64
Vaill Engineering Company	240
Van Keuren Co.	28
Van Norman Company	8-9
Vickers Inc.	199
Vlier Engineering Inc.	156
Vulcan Tool Corp.	245
Walker Co., Inc., O. S.	256
Waltham Machine Works, Inc.	248
Warner & Swasey Company	22-23
Waterbury Farrel Foundry & Machine Company	242
Weldon Tool Company	246
Wendt Sonis Company	189
White & Bagley Company	202
Wilson Air Collet Closer Inc.	252
Wilson Mechanical Instrument Co.	248
Winter Brothers Company	36
Woodruff & Stokes	218
Zagar Tool Inc.	206

SEARCHLIGHT SECTION
(Classified Advertising)

H. E. Hilty, Mgr.

EMPLOYMENT
- Positions Vacant 260
- Selling Opportunities Offered 260
- Selling Opportunities Wanted 260

SPECIAL SERVICES
- Contract Work 260
- Chowning Regulator Corp. 260
- General Pattern Works 260
- O.K. Tool Co., Inc. 260

EDUCATIONAL
- Books 260

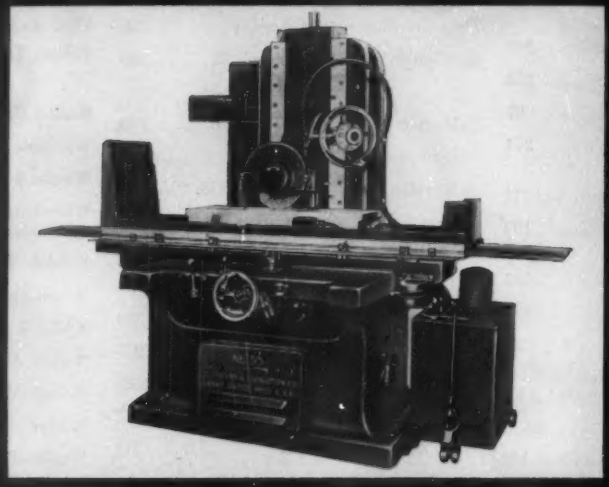
EQUIPMENT
- (Used or Surplus New) For Sale 261-266

WANTED
- Equipment 260

ADVERTISERS INDEX

Aaron Machinery Co., Inc.	264
Atlas Equipment Co.	265
Bennett Machinery Co.	266
Botwinik Bros. of Mass. Inc.	262
Brownell Machine Tool Inc., Hazard	262
Collins Engineering Co.	260
Dayton Pump & Manufacturing Co., The	260
Doak, James	260
Dony Machinery Co.	265
Eastern Machinery Co., Inc.	261
Falk Mill Supply Co., Inc.	263
Hill-Clarke Machinery Co.	265
Hyman & Sons, Jos.	264
Indianapolis Machinery & Supply Co.	266
Machine Tool Publications	260
Miles Machinery Co.	266
M & N Hydraulic Press Corp.	266
Morey Machinery Co., Inc.	262
National Machinery Exchange	266
Noll Equipment Co.	265
O'Connell Machinery Co.	264
Peacock Corp.	260
Radax Manufacturing Co., Inc.	266
Republic Machinery Co.	262
Samson Machinery Co.	260
Smith Machinery Sales	266
Triplex Machine Tool Corp.	264
Universal Gear Works Inc.	260
Wigglesworth Industrial Corp.	266
Williams, Edward Hale	266

When the need is for SPEED—and PRECISION



You need a

GRAND RAPIDS GRINDER

You get so much more for your money

Every feature of each Grand Rapids Hydraulic Feed Surface Grinder is designed for extra value, extra accuracy, extra high-speed performance.

You get a one-piece column and base. A single massive casting for vibrationless rigidity and permanent alignment between cross travel ways and upright head ways.

You get hydraulic operation of both longitudinal table travel and cross feed. On the larger machine the wheel head is powered for rapid vertical travel to save even more time. *The model 55 has longitudinal table speed of 125 fpm.!*

All parts are machined to micrometric tolerances and precision assembled to give you perfect freedom of action and entire elimination of play.

That's why 6 out of every 10 Grand Rapids Hydraulic Feed Surface Grinders are sold to customers already using Gallmeyer and Livingston grinding machinery. We will be pleased to quote on your needs.

GET THE FULL STORY ON ALL ADVANTAGES

Ask for Grand Rapids Surface Grinders catalog and get full details on all models and accessories. Catalog of Grand Rapids Universal Cutter and Tool Grinders also available on request. No obligation, mail coupon today to:

GALLMEYER & LIVINGSTON CO.
430 Straight Ave., Grand Rapids, Mich.

Please send me the following literature without obligation:

☐ Grand Rapids Surface Grinder Catalog
☐ Grand Rapids Universal Cutter and Tool Grinder Catalog

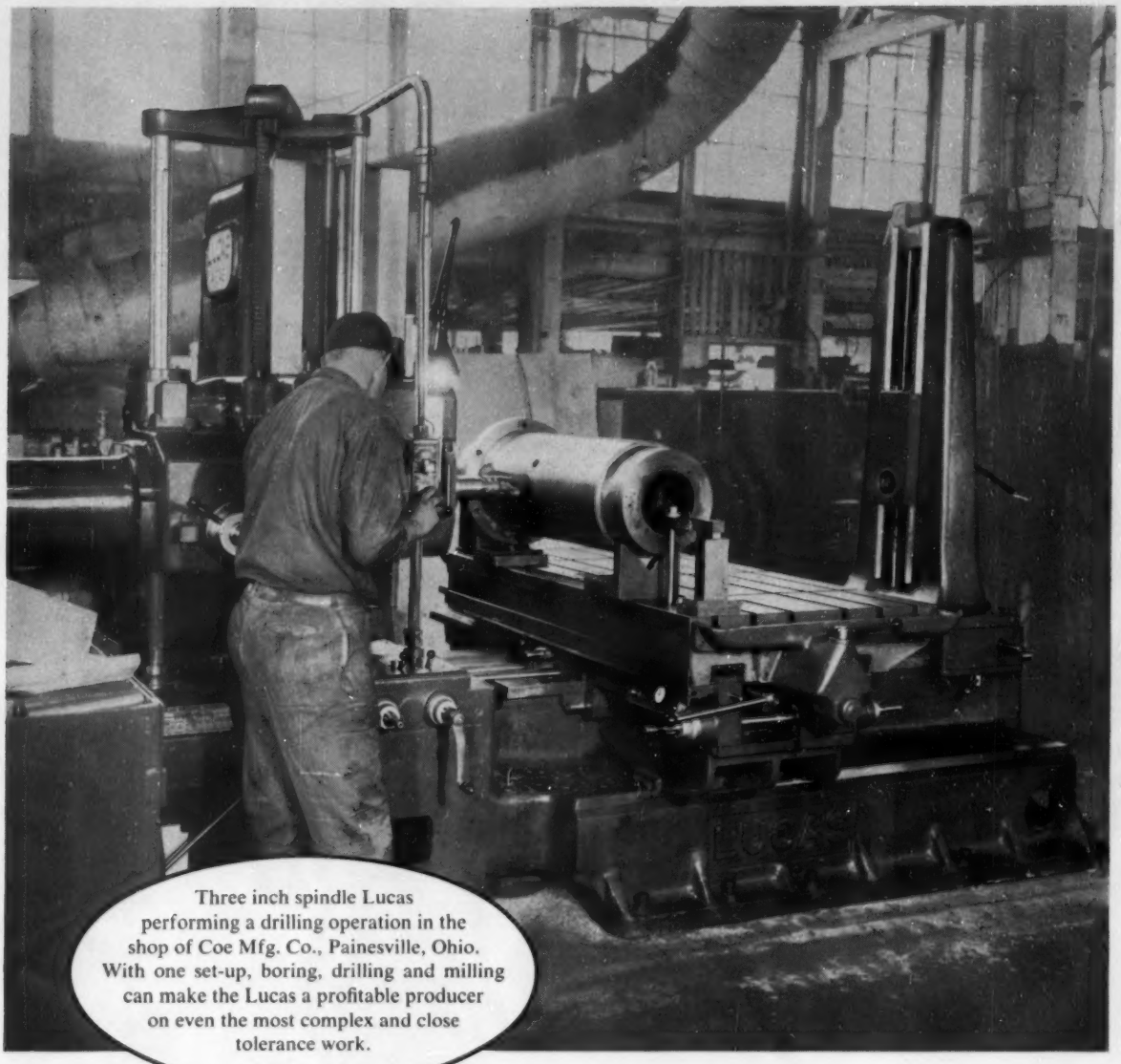
NAME:_____

POSITION:_____

FIRM:_____

FIRM ADDRESS:_____

All inquiries will be answered within 24 hours



Three inch spindle Lucas performing a drilling operation in the shop of Coe Mfg. Co., Painesville, Ohio. With one set-up, boring, drilling and milling can make the Lucas a profitable producer on even the most complex and close tolerance work.

If you operate a contract shop, JUST ONE LUCAS will enable you to out-bid competition on a wide variety of work.

It will prove to be your most versatile and PROFITABLE machine — on one piece or a thousand — because it can perform a wider variety of operations than is possible on any other machine in your shop.

On many contracts your new Lucas will cut a big slice out of your COST DOLLAR and add substantially to your PROFIT DOLLAR.

A moderate investment will put this smaller size 3″ spindle, table type Horizontal Boring Machine to work making money for you.

Write for the NEW Lucas catalog — just off the press.

LUCAS MACHINE DIVISION

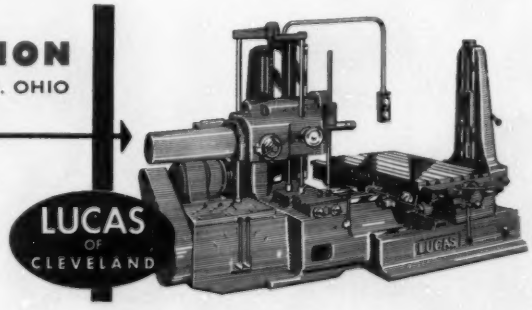
THE NEW BRITAIN MACHINE COMPANY • CLEVELAND 8, OHIO

. . . Machines for Making Progress

Three, four, five and six inch spindle

Lucas Horizontal Boring, Drilling and Milling Machines

Our general catalog is filed in the Sweet's Machine Tool Catalog File.



Completely new Bullard Cut Master V.T.L. Model 75 uses TIMKEN® bearings to insure extra load capacity, top precision

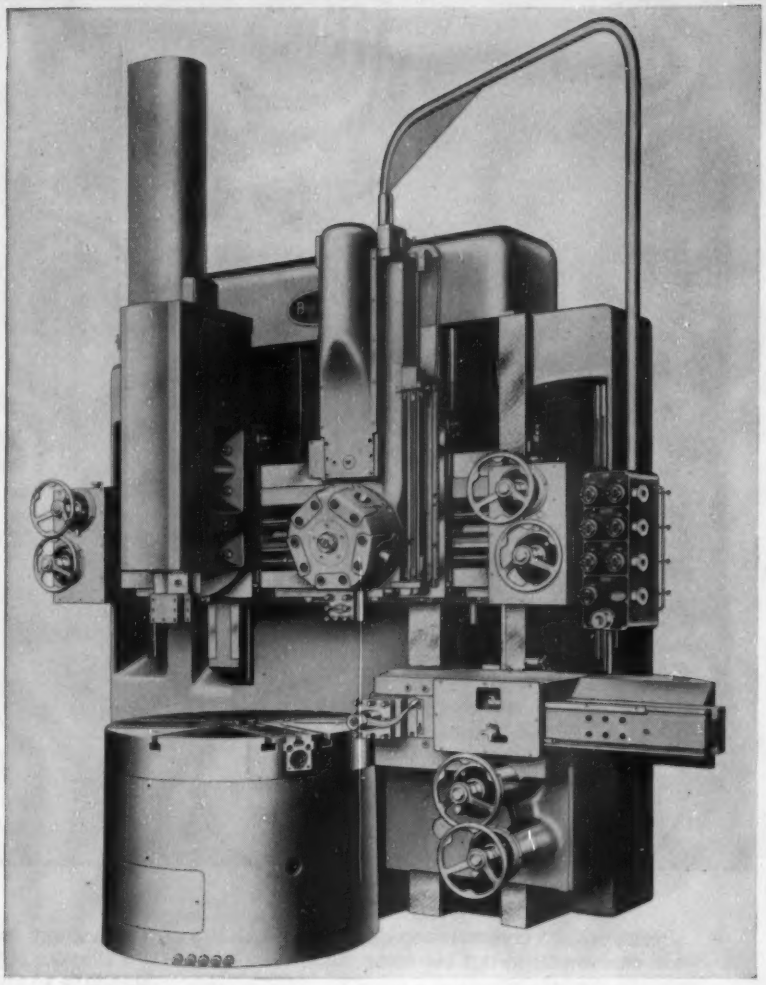
TO reduce power losses and provide highest efficiency at point of cutting, The Bullard Company engineers chose Timken® tapered roller bearings for the Bullard Cut Master Model 75, a completely new design of vertical turret lathes. Timken bearings are used in the table, headstock, feed and traverse mechanism, side, ram and turret head drives and other applications throughout the machine. They have been selected to meet the service requirements at each vital point with maximum efficiency. From 160 up to 196 Timken bearings are used according to the number and types of heads selected.

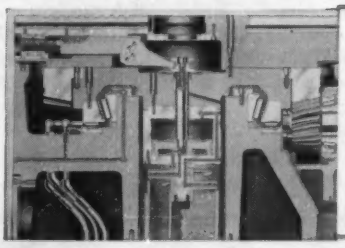
Timken bearings have extra load-carrying capacity that results from line contact between rollers and races. Tapered construction permits preloading, so deflection is kept to a minimum, and constant accuracy is maintained. Radial and thrust loads can be carried in any combination. Timken bearings are geometrically designed to roll true and precision manufactured to live up to their design. They hold shafts in rigid alignment, insure accurate gear mesh.

We take every step possible to make Timken bearings the best. We even make our own steel so we can control quality from beginning to end. We're the only U.S. bearing manufacturer that takes this extra step.

Make sure the machines you build or buy have bearings with the trademark "Timken". They're number one for value. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best



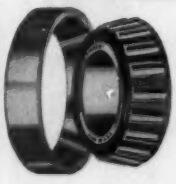


BULLARD design of table bearing construction uses Timken tapered roller bearings for long life, trouble-free performance.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭

BEARING TAKES RADIAL ⬭ AND THRUST →⬭← LOADS OR ANY COMBINATION ✳